

**MICROCHIP TECHNOLOGY INC.,
Petitioner,
v.
APTIV TECHNOLOGIES AG ET AL.,
Patent Owner.**

Petitioner's Oral Hearing Demonstratives
IPR2024-00228, -229, -230, -495, and PGR2024-00011
April 16-17, 2025

Table of Contents: Cut-Across Issues

- POSITA Issues
- The Challenged Patents and Prior Art
- Petitioner's Chang/Chang II Combination
 - Motivation to Combine
 - Expectation of Success
- Rebuttal to Aptiv's Motivation to Combine Arguments
- Rebuttal to Aptiv's "Dead End" Argument
 - Aptiv Reframes the Combination
 - The Combination Works (with Reset)
 - Aptiv's Motion to Strike
- Rebuttal to Aptiv's "Particularity" Argument
- Secondary Considerations

Table of Contents: Patent Specific Issues

- Petitioner's Combination (Chang + Chang II + Chutorash)
- Petitioner's Combination (Chang + Chang II + AN96527)
- Aptiv's argument re "hub control unit 46" vs. "hub 40"
- Aptiv's "multiplexing switches" argument
- Aptiv's "analog switch" and "digital routing logic"
- Aptiv's "multiple simultaneous connections" argument
- Aptiv's "plurality of ... consumer devices" argument
- Aptiv's "bypassing the USB bridge" argument
- Aptiv's "custom IC" argument
- Aptiv's "isochronous" argument
- The scrivener's error

The Parties' Experts

**Petitioner's Expert
Eric Welch**



**Patent Owner's Expert
Dr. Henry Houh**



THE POSITA ISSUES

The POSITA Issues

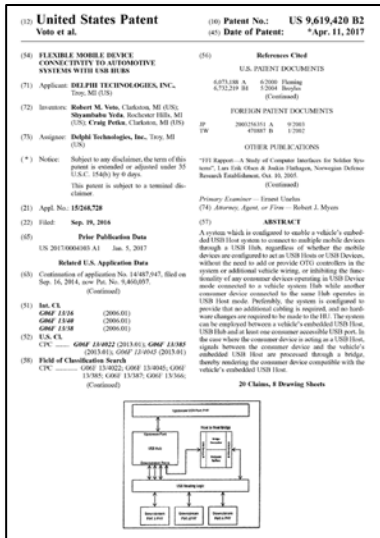
- The POSITA dispute centers on **whether a POSITA would have USB experience and familiarity** with the USB standards
 - Petitioner's POSITA definition requires USB knowledge/experience
 - Patent Owner's definition does not
- Petitioner should **prevail under either definition**
- Petitioner's Motion to Exclude Dr. Houh's testimony
 - Dr. Houh's uses the **wrong POSITA definition**
 - Dr. Houh **lacks the USB experience/knowledge** of a POSITA
- Dr. Houh lacks credibility and his testimony merits **little/no weight**

Petitioner's POSITA Definition is Correct

- The **claimed subject matter** is USB
- The Challenged Patents **presume USB familiarity**
- The **prior art** expressly references and builds on a **USB knowledge base**
- The **USB standards** were well-known and ubiquitous by 2013

The Claims are All About USB

- Every claim recites “USB”:
 - “USB port[s]”
 - “USB hub”
 - “USB bridge”
 - “USB routing switch”
 - “USB device”
 - “USB host



1. A Universal Serial Bus (USB) hub module, comprising:
 - a first USB port configured to be connected to a USB host;
 - a second USB port configured to be connected to a consumer device;
 - a USB hub interconnected to the first USB port and the second USB port;
 - a USB bridge interconnected to the USB hub; and
 - a USB routing switch interconnected to the USB bridge, the USB hub, and the second USB port, wherein the USB routing switch is configured to connect the second USB port to the first USB port through the USB bridge, thereby providing bidirectional initiation of communication between the USB host and the consumer device when the consumer device connected to the second USB port is in a USB host mode and wherein the USB routing switch is configured to connect the second USB port directly to the first USB port through the USB hub, thereby only responding to communication initiated by the USB Host when the consumer device connected to the second USB port is in a USB device mode.

EX1003 ('420 patent), Cl. 1

The Challenged Patents are All About USB

- The specification repeatedly references the USB standards
 - Col. 1, 17-18
 - Col. 3:18-22
 - Col. 6:28-30
 - Col. 7:66-8:4
 - Col. 8:45-48
 - Col. 10:36-47 (EX1005 ('962))

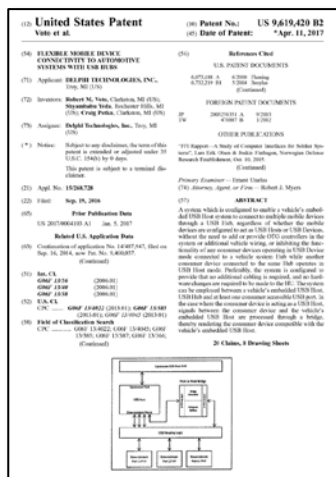
BACKGROUND

The present invention generally relates to Universal Serial Bus (“USB”) connectivity between, for example, mobile

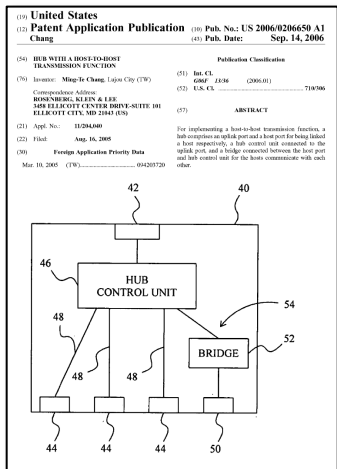
EX1003 ('420 patent), 1:17-18

USB Bridge. Once routed to the USB Bridge, the phone will detect a USB Device is connected and the phone will begin the standard USB enumeration sequence. The detection and enumeration processes are defined by USB standards and not explained here in detail. However, for purposes of

EX1003 ('420 patent), 6:28-30



Chang is in the Context of the USB 2.0 Standard

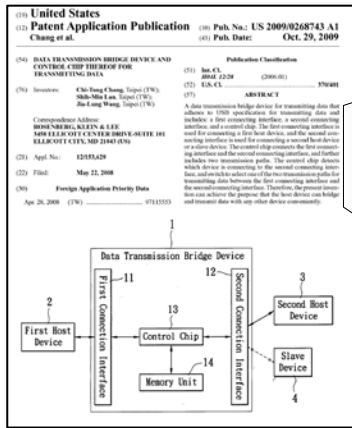


BACKGROUND OF THE INVENTION

[0002] In order to establish a communication channel between two computers, conventionally, a local area network (LAN) is employed to link the two computers, which is much inconvenient for users. Currently, a USB 2.0 host-to-host transmission cable enables to establish a communication channel between two computers simpler and more efficient. USB 2.0 has a high-speed transmission rate up to 480 Mb/s, and is therefore suitable for large volumes of data transmission, which is very convenient for a computer user who needs to exchange a large amount of data. However, using a USB transmission cable inevitably occupies a USB port on the computer, and the user must prepare the USB host-to-host transmission cable in advance, both still causing inconvenience to the user.

Chang (EX1014), [0002]

Chang II Adopts the USB Standard



(57)

ABSTRACT

A data transmission bridge device for transmitting data that adheres to USB specification for transmitting data and includes: a first connecting interface, a second connecting interface, and a control chip. The first connecting interface is used for connecting a first host device, and the second connecting interface is used for connecting a second host device

- Chang II repeatedly recites “USB”:

- [0011]
- [0012]
- [0021]
- [0030]
- [0046]

Chang II (EX1015), Abstract

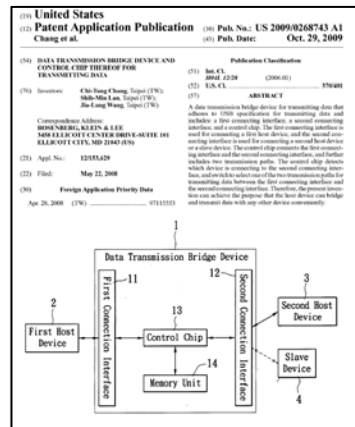
BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention is related to a bridge device for transmitting data; and more particular to a data transmission bridge device and control chip thereof for transmitting data that adopts USB specification, and can utilize switching to bridge between two host devices for transmitting data.

Chang II (EX1015), [0002]

Chang II Adopts the USB Standard



[0030] Of course, the connector type of the second connection interface 12 (A-Type male connector) is not limited to what is shown in the present embodiment. In practical design, the second connection interface 12 can also directly adopt an A-Type male connector and a B-Type male connector of USB specification to achieve dual connector type design. Or, the second connection interface 12 can also adopt a B-Type male connector, then pair with an adapter to acquire an A-Type male connector of USB specification. Further, other combinations and other connector types are too numerous to list, but those connector types covered under USB specification is all within the scope of the present invention.

Chang II (EX1015), [0030]

Petitioner's Level of Skill in the Art

The '420 patent pertains generally to the field of USB connectivity (*e.g.*, USB systems/architectures/communications), though other technical fields may be relevant. *See* EX1003, 1:17-19. A POSITA at the time of the alleged invention would have been well-versed in USB standards (including the USB 2.0 and 3.0 Specifications and the OTG Supplement) and the design/deployment of USB hosts, USB devices, and USB hubs, including suitable environments for USB systems. A POSITA would also have had a working understanding of network/communication architectures (*e.g.*, master/slave) and components (*e.g.*, host-to-host bridges), computer hardware and peripherals, computer programming, and the design/implementation of communication software/firmware/drivers in standard operating systems (*e.g.*, Windows and Linux) and embedded systems. Welch, ¶¶45-49.

Petitioner's Level of Skill in the Art

A POSITA would have had at least a four-year degree in electrical engineering, computer engineering, computer science, or a related field and substantial experience (*e.g.*, several years) designing USB systems, including USB hosts, USB hubs, and USB devices. A relevant advanced degree may substitute for some work experience. Welch, ¶¶45-49. Similarly, relevant work experience may substitute for formal education. *Id.*

-228 Pet. (Paper 1), 23

PO's Level of Skill in the Art

At the time of the invention, a POSITA would have had a bachelor's degree in computer science, electrical engineering, or an equivalent, and two years of professional experience working with computer network protocols such as USB.

(EX2019, ¶26.) Lack of work experience can be remedied by additional education, and vice versa. (EX2019, ¶26.)

-228 POR (Paper 25), 3-4

USB was Ubiquitous and Extremely Well-Known by 2013

Universal Serial Bus 3.0 Specification

Hewlett-Packard Company
Intel Corporation
Microsoft Corporation
NEC Corporation
ST-NXP Wireless
Texas Instruments

USB is the most successful PC peripheral interconnect ever defined and it has migrated heavily into the CE and Mobile segments. In 2006 alone over 2 billion USB devices were shipped and there are over 6 billion USB products in the installed base today. End users “know” what USB is. Product developers understand the infrastructure and interfaces necessary to build a successful product.

USB 3.0 Spec (EX1023), [0029]

Institution Decision

place of some formal education. *Id.* Petitioner contends that a POSITA would have more familiarity with USB related documents and system than contended by Patent Owner. We need not, and do not, resolve this dispute between the parties at this preliminary stage in this proceeding. We invite the parties to further address this issue, if they deem it necessary and appropriate.

For purposes of this Decision, we adopt Patent Owner's definition of the level of ordinary skill in the art. It appears consistent with what is

-228 ID (Paper 13), 10-11

Institution Decision

may reflect an appropriate level of skill). Accordingly, at this point, we consider the arguments and the evidence from the standpoint of such a skilled artisan. If a POSITA was considered to have the additional work experience with USB systems and familiarity with USB standards as proposed by Petitioner and the level of skill was enhanced, our Decision to institute trial would be further supported. However, our Decision to go forward with trial is supported by either of the definitions offered by the parties.

-228 ID (Paper 13), 11

Dr. Houh's Inconsistent Position from Another Proceeding



VII. LEVEL OF ORDINARY SKILL IN THE ART (“POSITA”)

50. The person of ordinary skill in the art in the period June 2000 to June 2001 (“POSITA”) would have had a Bachelor’s Degree in Electrical Engineering or a related subject, and at least one year of experience designing electronics devices for use in communications systems, including both hardware and software components. Less work experience may be compensated by a higher level of education, such as a Master’s Degree, and vice versa. The POSITA would have had working familiarity with known communications bus technologies and related standards, including those specified by 802.3u (Ex. 1005) and USB 1.1 (Ex. 1006).

IPR2020-00102, EX1003 (Houh Dec.), ¶50

Petitioner Should Prevail Under Either Definition

Even if a POSITA was not deemed to have *actual* USB knowledge *ex ante*,

Dr. Houh admitted a POSITA could readily review/understand the USB standards.

EX1084, 84:15-25, 91:8-17. And Dr. Houh admitted a POSITA would know basic

USB concepts like bridging, master/slave architecture, etc. *Id.*, 100:17-101:12,

102:3-8 (USB concepts generally), 103:21-104:2 (“master/slave” architecture),

104:24-105:4 (bridges). Accordingly, even under PO’s definition, the Challenged

Claims are unpatentable. Welch Reply, ¶¶18-31.

-228 Reply (Paper 30), 4

Petitioner Should Prevail Under Either Definition



12 A. I can pretty much read most networking
13 protocols and understand them to the extent necessary.

14 BY MR. JENSEN:

15 Q. Would you agree with me that that ability is
16 something a POSITA would have?

17 MR. BLUMENKOPF: Objection, form.

18 A. Well, I think the POSITA that I've laid out
19 certainly would have the capability to pick up a
20 specification such as a USB specification and review and
21 understand that and then be able to implement and make
22 devices based on the level of education and skill that
23 I've laid out in what my opinion is. I think they could
24 review and read these types of specifications and
25 understand them.

EX1084 (Dr. Houh), 84:15-25

Petitioner Should Prevail Under Either Definition



8 Q. Okay. Is it your opinion that a POSITA would
9 not have been well-versed in the USB 2.0, 3.0 and OTG
10 standards?

11 MR. BLUMENKOPF: Objection, form.

12 A. I mean, that's not exactly what I'm saying.
13 What I'm saying is that my level of POSITA would have
14 been perfectly capable of reviewing these standards and
15 specifications and understanding them sufficient to
16 understand the patented inventions and to even perhaps
17 make use of them.

EX1084 (Dr. Houh), 91:8-17

Petitioner Should Prevail Under Either Definition



21 Q. So, for example, would a POSITA under your
22 definition be familiar with the concept of a master/
23 slave network architecture?

24 MR. BLUMENKOPF: Objection, form.

25 A. I mean, that level of education, that specific
1 thing is very common -- you know, a very common concept
2 in computers and networking.

EX1084 (Dr. Houh), 103:21-104:2

24 Q. Under your definition of a POSITA, would a
25 POSITA have an understanding of the concept of bridging?

1 MR. BLUMENKOPF: Objection, form.

2 A. I mean, bridging is a very basic, common
3 networking concept that can be applied to a variety of
4 different specific protocol areas, yes.

EX1084 (Dr. Houh), 104:24-105:4

Genus PLC Does Not Support Aptiv

- Aptiv cites *Genus PLC* for POSITA definition that “unnecessarily recit[ed] specific knowledge” (Sur-reply, 21)
- But that case is factually distinguishable and supports Petitioner

Resp. 16. Patent Owner, however, objects to the inclusion of the second portion of Petitioner’s definition because it is “improperly injecting a purported knowledge of the claimed invention into the definition of a person of ordinary skill in the art. *Id.* at 17 (citing *Arendi S.A.R.L. v. Apple*

Having considered the arguments and evidence, we agree with Patent Owner that Petitioner’s definition of one of ordinary skill in the art unnecessarily recites specific knowledge, whereas the art itself demonstrates the level of skill in the art at the time of the invention. *See Okajima v.*

Genus PLC v. Inguran, LLC, IPR2021-01027, Paper 25 at 8 (PTAB Dec. 8, 2022)

Dr. Houh's Testimony Merits No/Little Weight

- Dr. Houh copied his declarations as shown by the redline comparisons in EX1091-1095 (one for each proceeding)
- Dr. Houh did not even change third-person references to himself

general knowledge. To the contrary, as Dr. Houh explains, while the POSITA's knowledge may include multiplexer components, it does not include the specific knowledge of how to use such generic switching components to modify Chang and Chang II to meet the specific routing requirements of the claims.

EX1088 (Dr. Houh Supp. Dec.), ¶78

Dr. Houh's Testimony Merits No/Little Weight

obvious based on the prior art disclosure. *See* Ex. 1003 ¶ 54. Instead, the declaration copies, word-for-word, Petitioner's conclusory assertions. *Compare id.*, with Pet. 28–29. The declaration sets forth Petitioner's conclusory assertions as though they are facts, rather than setting forth facts and evidence in support of Petitioner's assertions. Accordingly, I agree with the Board's explanation that "the cited declaration testimony is conclusory and unsupported, adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight" under 37 C.F.R.

Xerox Corp. et al. v. Bytemark, Inc., IPR2022-00624,
Paper 12, 5 (PTAB Aug. 24, 2022) (precedential)

Dr. Houh's Testimony Merits No/Little Weight

- The Board has repeatedly given Dr. Houh's testimony little/no weight
 - IPR2014-00086, Paper 42, 22-23 (“inconsistent testimony of Dr. Houh”)
 - IPR2017-01133, Paper 68, 22-24 (“[Dr. Houh's] testimony ... entitled to little weight.”)
 - IPR2017-00375, Paper 51, 23, 38-40 (“Dr. Houh, ‘provides no reasoned analysis or evidentiary support’”)
 - IPR2018-00361, Paper 22, 25 (“[W]e...do not credit Dr. Houh's testimony.”)
 - IPR2020-00102, Paper 8, 30 (“[W]e question Dr. Houh's testimony.”)
 - IPR2021-00482, Paper 29, 48 (“[W]e give Dr. Houh's testimony in this regard no weight.”)
 - IPR2021-01144, Paper 9, 17 (“Dr. Houh's statement ... is unsupported”)

Dr. Houh's Testimony Merits No/Little Weight

- Dr. Houh has several years experience in all the following areas:
 - “natural language processors and info[] retrieval systems” (IPR2018-00306, EX1003, ¶92)
 - “content delivery networks” (IPR2018-00864, EX1002, ¶32)
 - “wireless devices” (IPR2020-00316, EX1003, ¶47)
 - TV “remote controls” and “user interaction” (IPR2020-01598, EX1003, ¶45)
 - “web services” (IPR2021-01144, EX1004, ¶¶33- 34)
 - “designing GUIs” (IPR2024-00455, EX1003, ¶21)
 - “circuit design, digital design, and/or automation tools” (IPR2024-00476, EX1003, ¶47)
 - “creating and distributing multimedia” (IPR2017-01133, EX1003, ¶41)

Petitioner's Motion to Exclude Dr. Houh

- The Board should exclude Dr. Houh's testimony (EX2001 and EX2019) for two reasons:
 - Impermissible expert testimony by a lay person (FRE 701/702) (*viz.*, expert testimony by a non-expert who does not satisfy the qualifications of a POSITA)
 - Irrelevant, unreliable, and unfairly prejudicial for being based on an incorrect POSITA standard/definition
- The Board should also exclude Dr. Houh's secondary considerations testimony (re long-felt need, failure/skepticism of others, and copying) under *Daubert* and FRE 403

Petitioner's Motion to Exclude Dr. Houh

- Dr. Houh conceded at deposition that he rendered no opinions under Petitioner's POSITA definition

13 Q. Did you render any opinions in your
14 declarations under a different definition of a POSITA?

15 A. I mean, for the issues that the analysis, if I
16 understand, would be taken from that person of ordinary
17 skill, that's the level of skill that I applied.

18 I understand the petition is taking a
19 different view of the level of ordinary skill, but I
20 applied -- which I think is wrong for -- that does not
21 reflect -- I think petition's proposed level of ordinary
22 skill does not reflect the true ordinary level of skill
23 applicable to the challenged patents, but I applied what
24 I've laid out as a POSITA.

25 Q. And you didn't render any opinions under
1 someone else's definition of a POSITA in your reports,
2 did you?

3 A. In this section I don't see that I said I did
4 that.

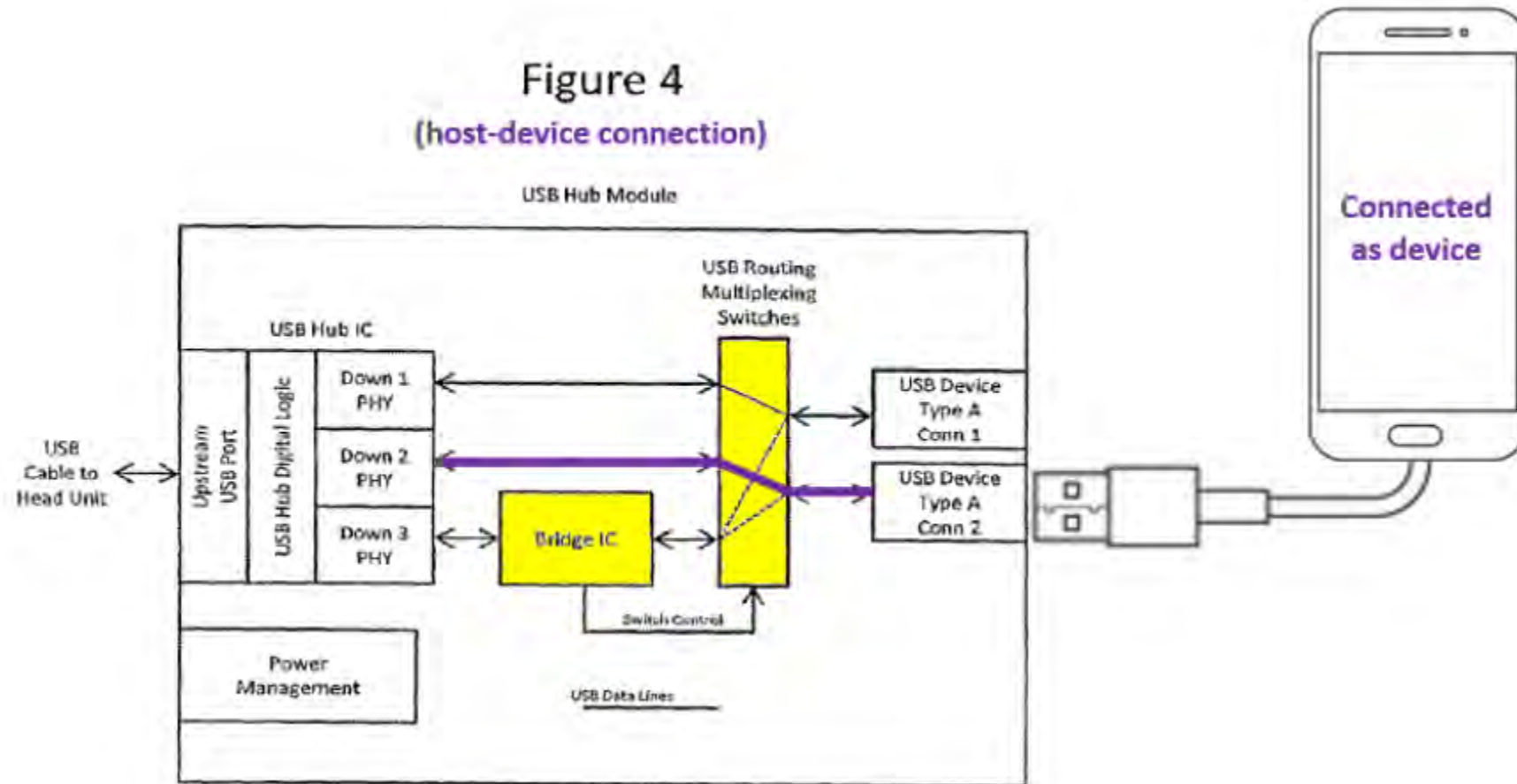
EX1084 (Houh Tr.), 76:13-77:4

Petitioner's Motion to Exclude Dr. Houh

- The Board should exclude Dr. Houh's secondary considerations testimony under *Daubert* and FRE 403
 - Secondary considerations such as “long-felt need in the industry for a device” “focus attention on economic and motivational, rather than technical issues.” *Graham v. John Deere Co.*, 383 U.S. 1, 36 (1966).
 - Dr. Houh has no expertise (or even personal knowledge) re long-felt need, failure/skepticism of others, or copying
 - He just “review[ed] the trial record” and characterized it
 - Long-felt need: self-contradictory testimony and no automotive industry expertise
 - Failure/skepticism of others: no personal knowledge or POSITA perspective offered
 - Copying: not an expert on intent, no personal knowledge, and dates are wrong

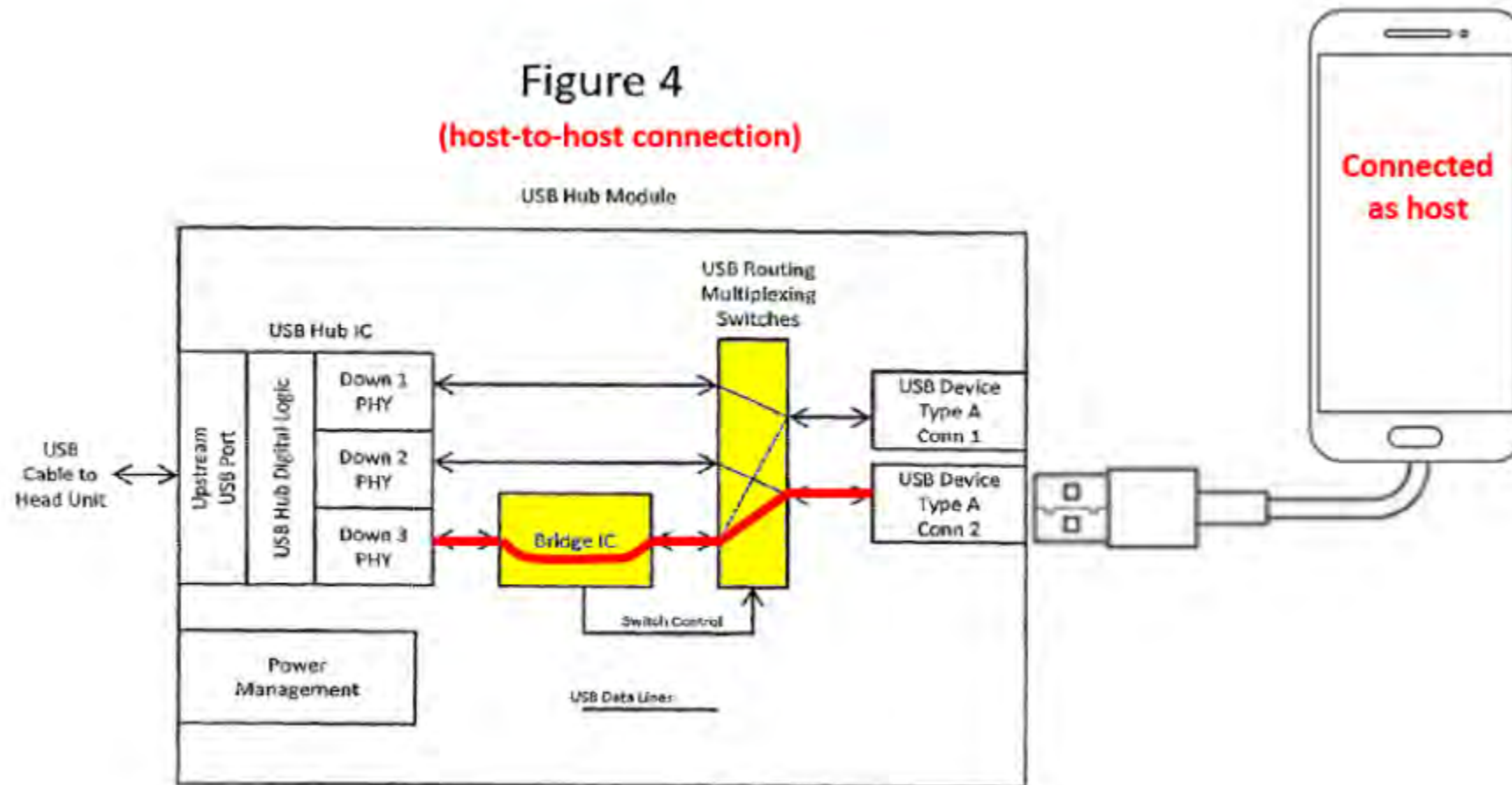
CHALLENGED PATENTS AND PRIOR ART

The Challenged Patents



'420 Patent (EX1003), Fig. 4 (annotated)

The Challenged Patents



'420 Patent (EX1003), Fig. 4 (annotated)

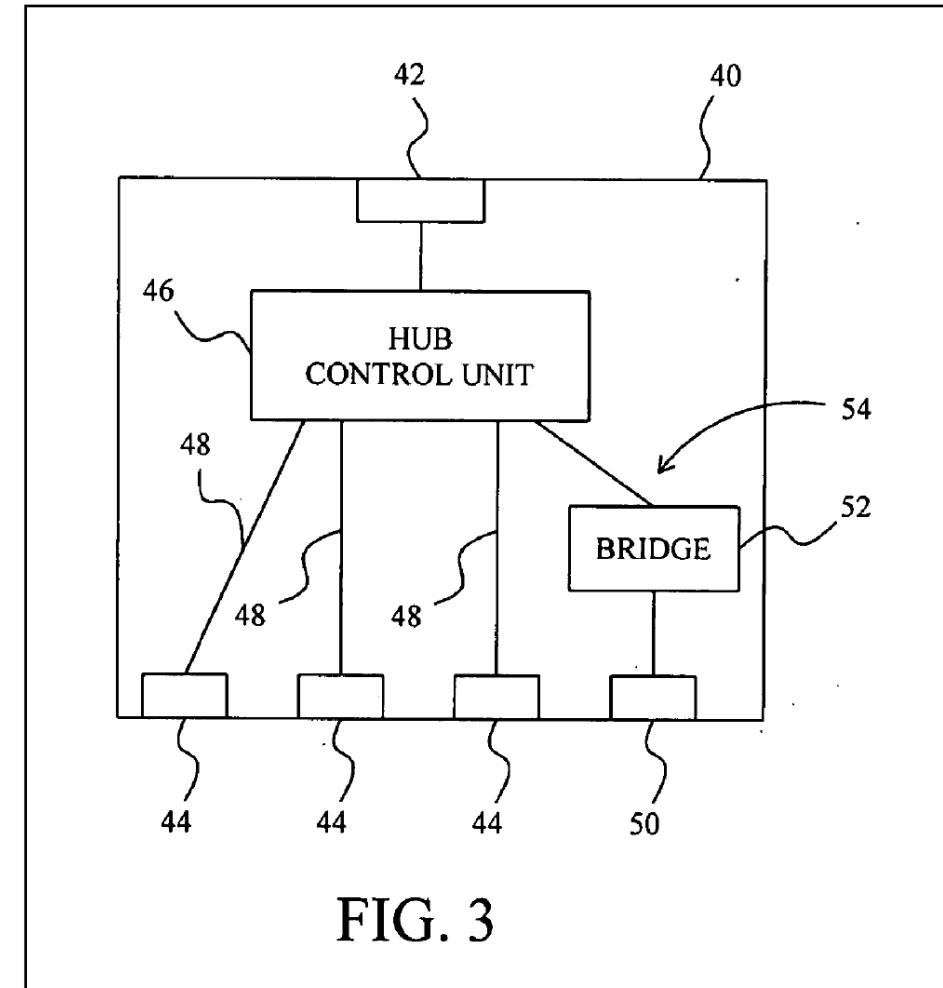
Summary of Prior Art Grounds

Prior Art	Proceeding	Patent	Claim(s)
Chang + Chang II	IPR2024-00228	'420	1-12, 15-17 (Ground 1)
	IPR2024-00495	'420	13-14, 18-20 (Ground 1)
	IPR2024-00229	'962	1-10, 14-17 (Ground 1)
	IPR2024-00230	'072	1 (Ground 1)
	PGR2024-00011	'643	1-15 (Ground 1)
Chang + Chang II + Chutorash	IPR2024-00230	'072	1 (Ground 2)
	PGR2024-00011	'643	2, 7, 13 (Ground 2)
Chang + Chang II + AN96527	IPR2024-00229	'962	11-13, 18-19 (Ground 2)

Chang (EX1014)

- U.S. Pub. 2006/0206650 to Chang
- Title: “Hub with a Host-to-Host Transmission Function”
- Published: September 14, 2006
- Prior art: §102(a)(2)

(19) United States	
(12) Patent Application Publication	(10) Pub. No.: US 2006/0206650 A1
Chang	(43) Pub. Date: Sep. 14, 2006
(54) HUB WITH A HOST-TO-HOST TRANSMISSION FUNCTION	Publication Classification
(76) Inventor: Ming-Te Chang , Lujou City (TW)	(51) Int. Cl. G06F 13/36 (2006.01)
Correspondence Address: ROSENBERG, KLEIN & LEE 3458 ELLICOTT CENTER DRIVE-SUITE 101 ELLICOTT CITY, MD 21043 (US)	(52) U.S. Cl. 710/306
(21) Appl. No.: 11/204,040	(57) ABSTRACT
(22) Filed: Aug. 16, 2005	For implementing a host-to-host transmission function, a hub comprises an uplink port and a host port for being linked a host respectively, a hub control unit connected to the uplink port, and a bridge connected between the host port and hub control unit for the hosts communicate with each other.
(30) Foreign Application Priority Data	
Mar. 10, 2005 (TW)..... 094203720	

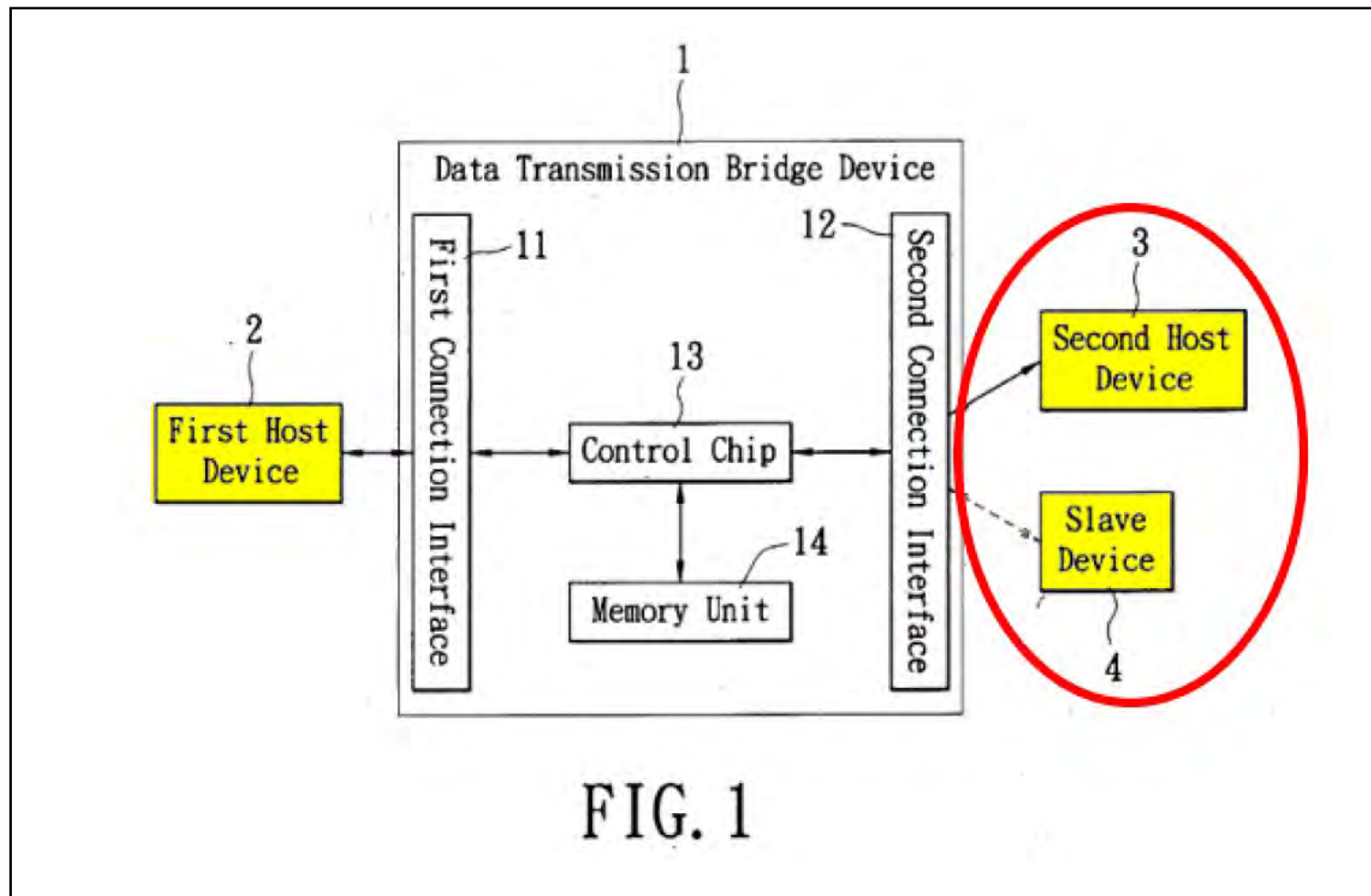


Chang (EX1014), Fig. 3

Chang II (EX1015)

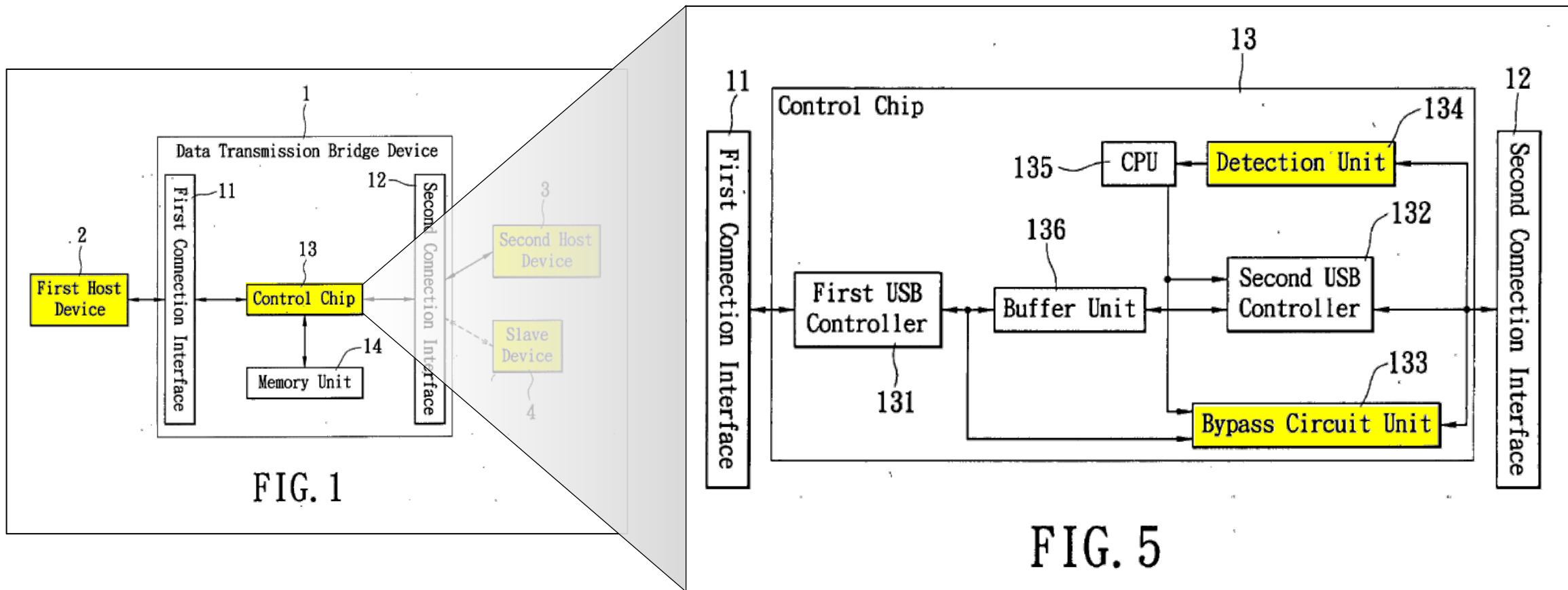
- U.S. Pub. 2009/0268743 to Chang
- Title: “Data Transmission Bridge Device and Control Chip Thereof for Transmitting Data”
- Published: October 29, 2009
- Prior art: §102(a)(2)

(19) United States	
(12) Patent Application Publication	
Chang et al.	
(10) Pub. No.: US 2009/0268743 A1	
(45) Pub. Date: Oct. 29, 2009	
(54) DATA TRANSMISSION BRIDGE DEVICE AND CONTROL CHIP THEREOF FOR TRANSMITTING DATA	
(76) Inventors: Chi-Tung Chang, Taipei (TW); Shih-Min Lan, Taipei (TW); Jia-Lung Wang, Taipei (TW)	
Correspondence Address: ROSENBERG, KLEIN & LEE 3458 ELLICOTT CENTER DRIVE-SUITE 101 ELLICOTT CITY, MD 21045 (US)	
(21) Appl. No.: 12/153,629	
(22) Filed: May 22, 2008	
(30) Foreign Application Priority Data	
Apr. 28, 2008 (TW) 97115553	
(51) Int. Cl. H04L 12/28 (2006.01)	
(52) U.S. Cl. 370/401	
(57) ABSTRACT	
A data transmission bridge device for transmitting data that adheres to USB specification for transmitting data and includes: a first connecting interface, a second connecting interface, and a control chip. The first connecting interface is used for connecting a first host device, and the second connecting interface is used for connecting a second host device or a slave device. The control chip connects the first connecting interface and the second connecting interface, and further includes two transmission paths. The control chip detects which device is connecting to the second connecting interface, and switch to select one of the two transmission paths for transmitting data between the first connecting interface and the second connecting interface. Therefore, the present invention can achieve the purpose that the host device can bridge and transmit data with any other device conveniently.	



Chang II (EX1015), Fig. 1

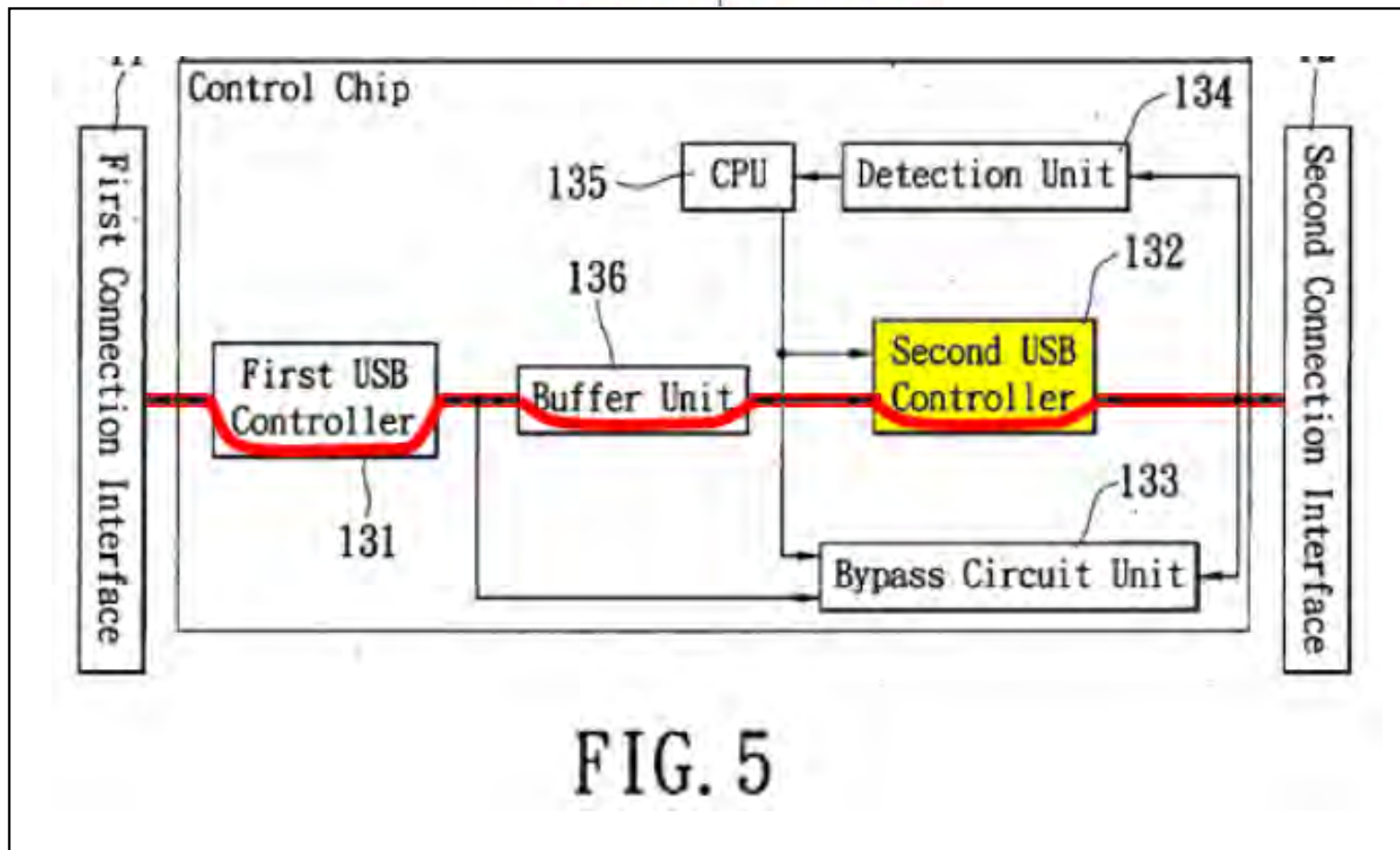
Chang II (EX1015)



Chang II (EX1015), Fig. 5

Chang II (EX1015)

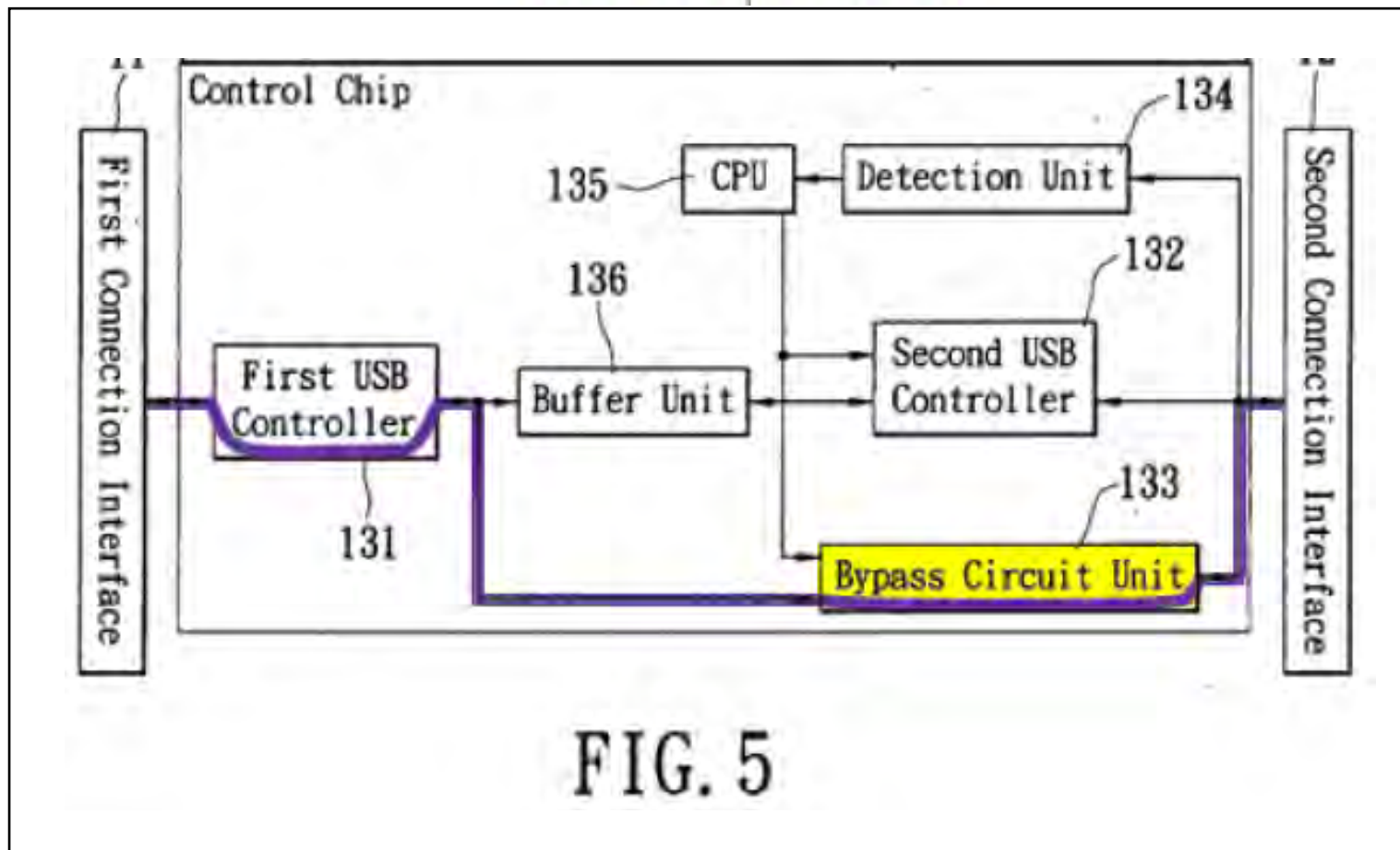
Host-to-Host



Chang II (EX1015), Fig. 5 (annotated)

Chang II (EX1015)

Host-to-Device

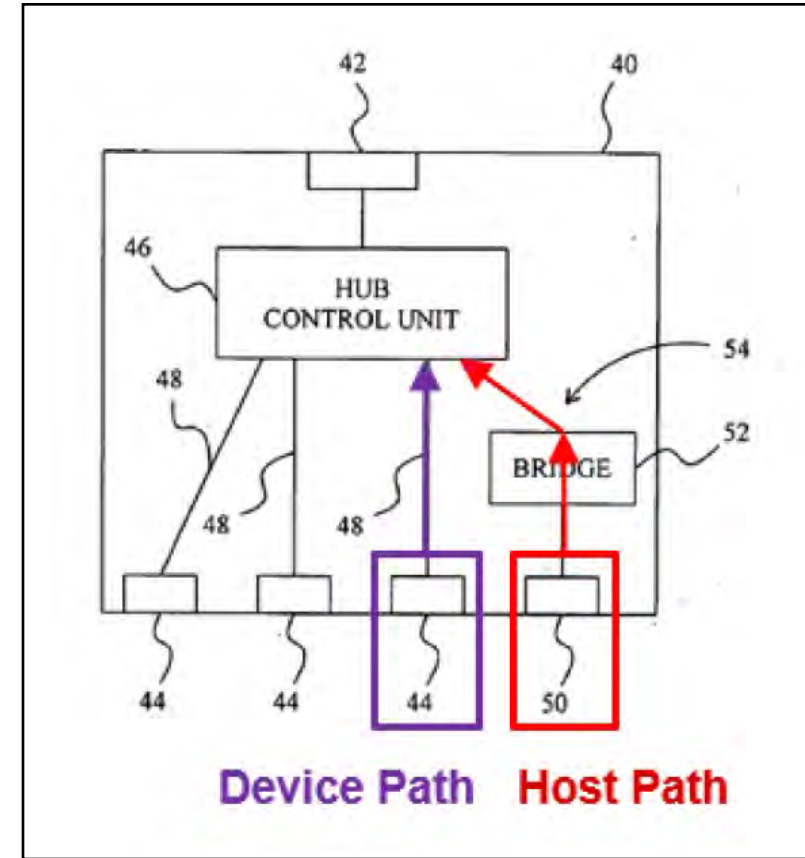


Chang II (EX1015), Fig. 5 (annotated)

PETITIONER'S COMBINATION (CHANG + CHANG II)

Petitioner's Combinations

- Petitioner proposes multiple Chang/Chang II combinations
- Chang is the primary reference in all of them
 - Discloses a USB hub
 - Discloses **dedicated host-device paths**
 - Discloses **dedicated host-to-host path** via bridge
- Lacks dual-role port operation



Chang (EX1014), Fig. 3 (annotated)

Chang II Teaches Dual-Role Ports

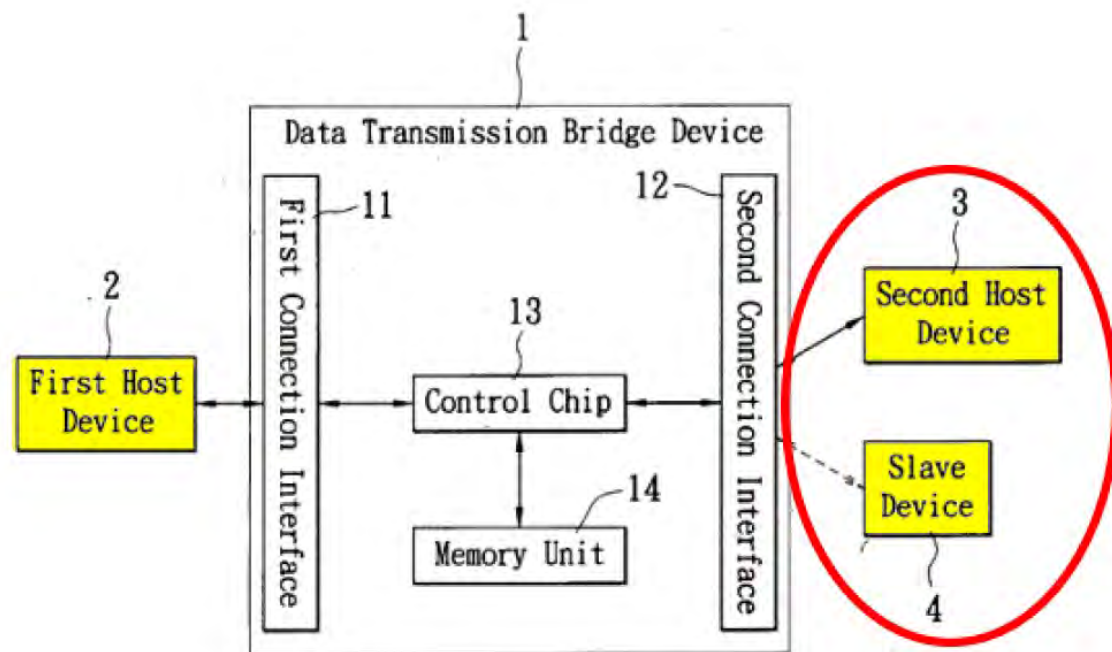


FIG. 1

Chang II (EX1015), Fig. 1

[0030] Of course, the connector type of the second connection interface 12 (A-Type male connector) is not limited to what is shown in the present embodiment. In practical design, the second connection interface 12 can also directly adopt an A-Type male connector and a B-Type male connector of USB specification to achieve dual connector type design. Or, the second connection interface 12 can also adopt a B-Type male connector, then pair with an adapter to acquire an A-Type male connector of USB specification. Further, other combinations and other connector types are too numerous to list, but those connector types covered under USB specification is all within the scope of the present invention.

Chang II (EX1015), [0030]

Chang II Teaches Host/Device Detection

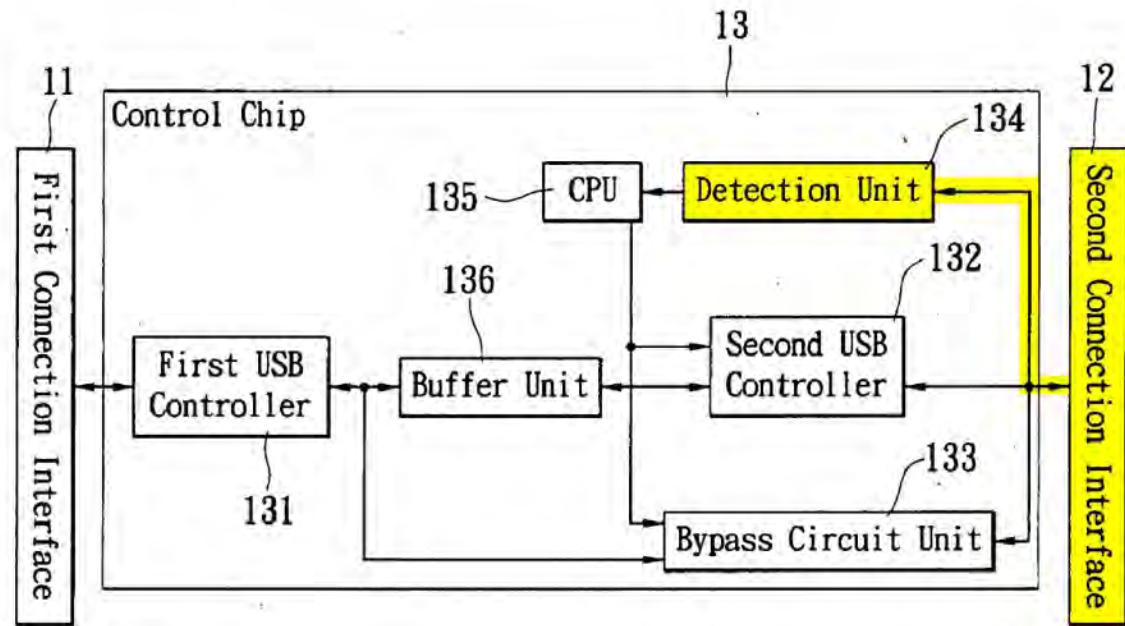


FIG. 5

Chang II (EX1015), Fig. 5 (annotated)

[0038] The Detection unit 134 is also connected to the second connection interface 12, and the detection unit 134 will automatically operate to switch between a virtual host state and a virtual slave state, wherein the states are used to determine the type of device currently connected with the second connection interface 12, and a detection signal (bridging detection signal or slave detection signal) is produced accordingly. On the other hand, the CPU 135 is for receiving

Chang II (EX1015), [0038]

Chang II Teaches Host-Device and Host-Host Paths

[0021] The present Invention designed a data transmission bridge device for transmitting data between two devices (host-host or host-slave) through simple hardware structure, the main feature is the provision of two different transmission paths, so that by automatically detecting the type of device connected (host or slave) the present invention can switch to the proper transmission path, thus not only can host-slave operation between the host device and the slave device be supported, but direct bridging between two host device for data transfer is also possible. Further more the present inven-

Chang II (EX1015), [0021]

Chang II Teaches Switching Between Host/Device AND Host/Host Paths

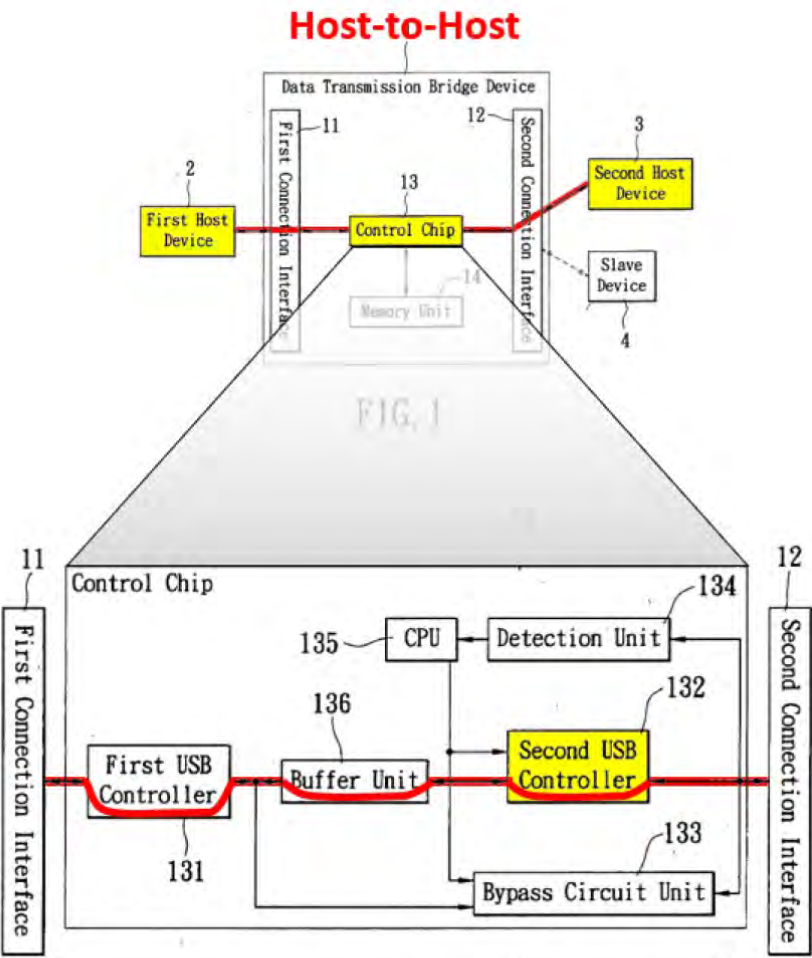


FIG. 5

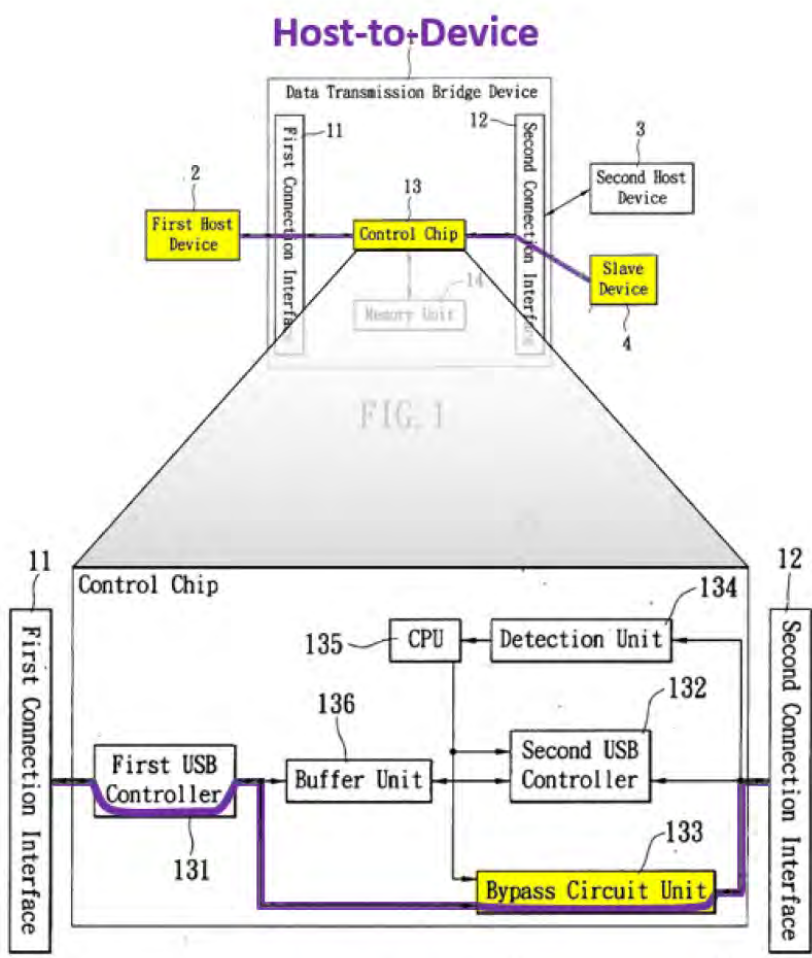


FIG. 5

Chang II (EX1015), Figs. 1, 5 (annotated)

USB Muxes/Crossbars Were Well-Known Commercial Components

Your request so far: Function USB Switch (26)

Product Parametric Data

USB Switches (26) View All Parameters Export as Excel Download to PDF

Part Number	Switches Configuration	Number of Switches	Bandwidth	ESD	Package Type	Function	Select All/None
NEW FSA9285 MCPC Compliant USB Port Multimedia Switch with Accessory Detection	SPDT	2		5.0	WLCSP	Media/USB	☐
NEW FSA880 USB Port 2:1 Switch with Accessory and Charger Detection	2:1	1		15.0	USB-P	USB Switch	☐
NEW FSUSB74 High Speed USB 2.0 Switch/Multiplexer	4:1	1		2.0	MLP, USB-P	USB Switch	☐
NEW FSUSB73 High Speed USB 2.0 Switch/Multiplexer	2:1	1		2.0	USB-P	USB Switch	☐
NEW FSA831 USB2.0 High-Speed (480Mbps) Charger Detection with Isolation Switch	2:1 w/ Charge Detection	2		15.0	MicroPak	USB Switch	☐
NEW FSA881 USB Port 2:1 Switch with Accessory and Charger Detection	2:1	1		15.0	USB-P	USB Switch	☐
FSUSB42 Low Power, Two-Port, Hi-Speed USB2.0 (480Mbps) Switch	DPDT	1	750.0	5.0	MicroP, USB-P	USB Switch	☐
FSUSB30 Low Power 2-Port Hi-Speed USB 2.0 (480 Mbps) Switch	DPDT	1	750.0	5.0	20Pin MicroP, MicroPak, USB-P	USB Switch	☐
FSA221 Multimedia and USB 2.0 Hi-Speed and Audio Switches w/ Negative Signal Capability	DPDT	1	750.0	7.0	MicroP, MicroPak, USB-P	Media/USB, Audio	☐
FSA223 Multimedia and USB 2.0 Hi-Speed and Audio Switches w/ Negative Signal Capability	DPDT	1	750.0	7.0	MicroP, MicroPak, USB-P	Media/USB, Audio	☐
FSA9280A USB 2.0 Accessory Detection Switch w/ 28V FET	1:1 with Charge Detection	2	750.0	4.0	USB-P	Media/USB, USB Switch	☐
FSUSB31 Low Power Dual SPST Hi-Speed USB 2.0 (480 Mbps) Switch	SPST	2	750.0	7.0	MicroPak, USB-P	USB Switch	☐
FSUSB63 3:1 HS - USB Switch / Multiplexer	3:1	1	400.0		USB-P	USB Switch	☐
FSUSB11 Low Power Full Speed USB Switch	SPDT (w/NC)	2	950.0	5.0	MicroPak	USB Switch	☐
FSUSB45 Hi-Speed USB2.0 (480Mbps) Switch w/Dedicated Charger Port Detect	DPDT	2	750.0	5.0	MicroPak	USB Switch	☐
FSA9288A USB 2.0 Accessory Detection Switch w/ 28V FET	1:1 with Charge Detection	2	750.0	4.0	USB-P	Media/USB, USB Switch	☐
FSUSB20 Low Power 1 Port Hi-Speed USB (480Mbps) Switch	DPDT	2	750.0	4.0	DGPH, MicroP, MicroPak	USB Switch	☐
FSUSB22 Low Power 2 Port Hi-Speed USB 2.0 (480Mbps) Switch	SPDT	4	800.0	4.0	DGPH, MicroP, MicroPak, USB-P	USB Switch	☐
FSUSB46 Hi-Speed USB2.0 (480Mbps) DPST Switch with Dedicated Charger Port Detection	DPST	2	750.0	15.0	MicroPak, USB-P	USB Switch	☐
FSUSB23 Low Power Hi-Speed USB 2.0 (480 Mbps) Switch	DPDT	1	750.0	7.0	DGPH, MicroPak	USB Switch	☐
FSUSB40 Low Power, Two-Port, Hi-Speed USB2.0 (480Mbps) Switch	DPDT	1	750.0	7.0	MicroPak, USB-P	USB Switch	☐
FSA201 Multimedia, USB 2.0 and Audio Switch	DPDT	2	200.0	2.0	MicroP, MicroPak	Media/USB, Audio	☐
FSA2000 Auto Selecting HS-USB Switch with Cap-Free Headphone Audio Amplifier	USB and Headphone Amplifier	2	750.0	4.0	USB-P	Media/USB, Audio	☐
FSA203 Multimedia, Hi-Speed USB, Video, and Negative Swing Audio Switch with Video Amp/Filter	DPDT	1	750.0	3.0	DGPH	Media/USB, Audio	☐

NEW FSUSB74 High Speed USB 2.0 Switch/Multiplexer

NEW FSUSB73 High Speed USB 2.0 Switch/Multiplexer

NEW FSA831 USB2.0 High-Speed (480Mbps) Charger Detection with Isolation Switch

NEW FSA881 USB Port 2:1 Switch with Accessory and Charger Detection

FSUSB42 Low Power, Two-Port, Hi-Speed USB2.0 (480Mbps) Switch

FSUSB30 Low Power 2-Port Hi-Speed USB 2.0 (480 Mbps) Switch

EX1059 (Product Listing), 1

Bodily Incorporation is Not the Test

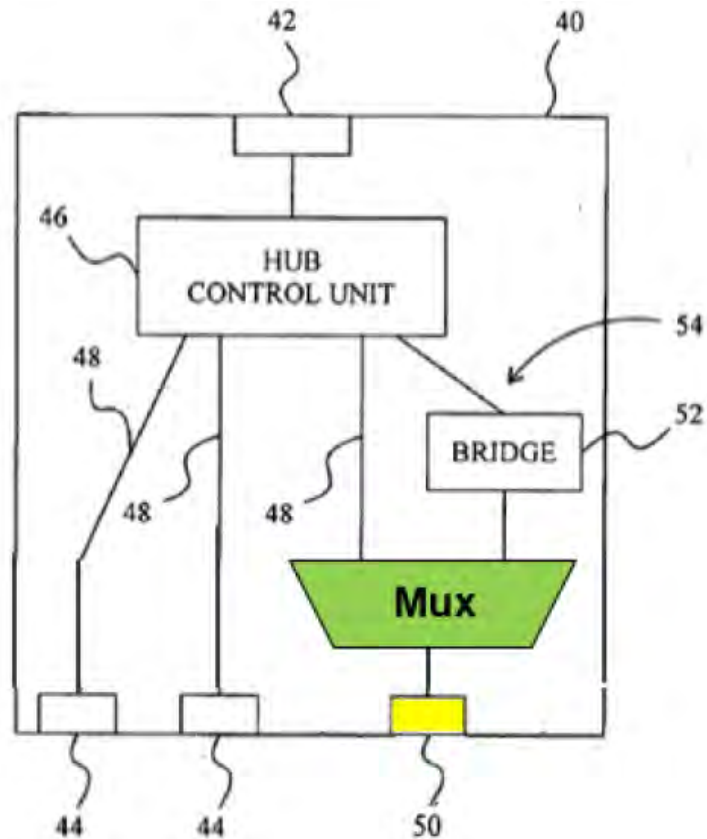
1108, 279 F.2d 689, 126 USPQ 370 (1960). The test for obviousness is not whether the **[**34]** features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. In re Wood, 599 F.2d 1032, 202 USPQ 171 (CCPA 1979); In re Passal, 57 CCPA 1151, 426 F.2d 828, 165 USPQ 720 (1970); In re Richman, 57 CCPA 1060, 424 F.2d 1388, 165 USPQ 509 (1970); In re Rosselet, 52 CCPA 1533, 347 F.2d 847, 146 USPQ 183 (1965).

In re Keller, 642 F.2d 413, 425 (CCPA 1981)

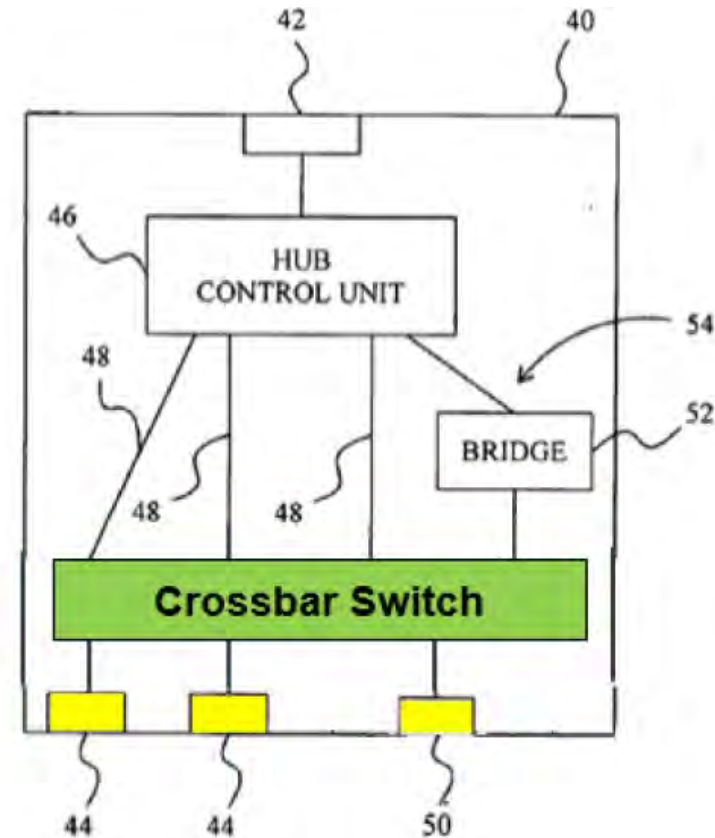


Petitioner's Combinations

“Mux” Implementation (’072 and ’643 Petitions)



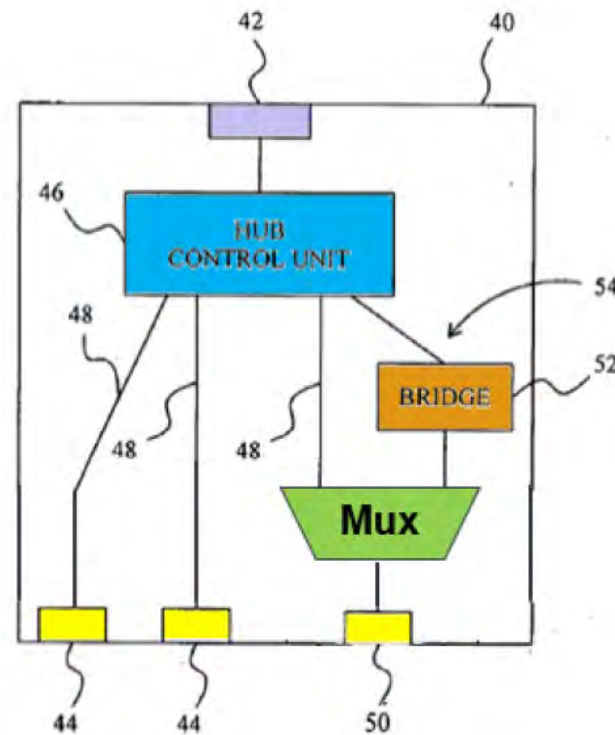
“Crossbar” Implementation (’420 and ’962 Petitions)



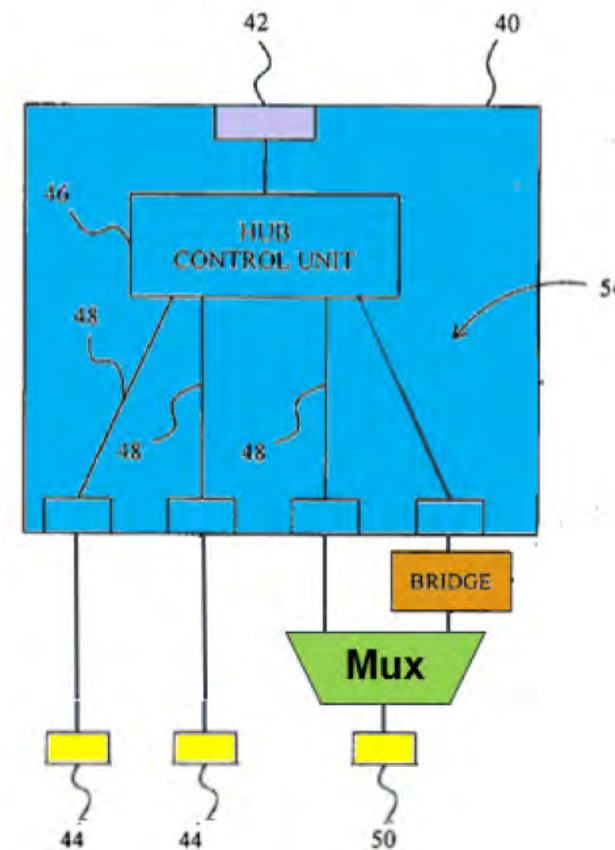
Chang (EX1014), Fig. 3 (modified)

Petitioner Proposes Alternative “Hub 40” and “Hub 46” Invalidity Reads

Chang (Hub 46)

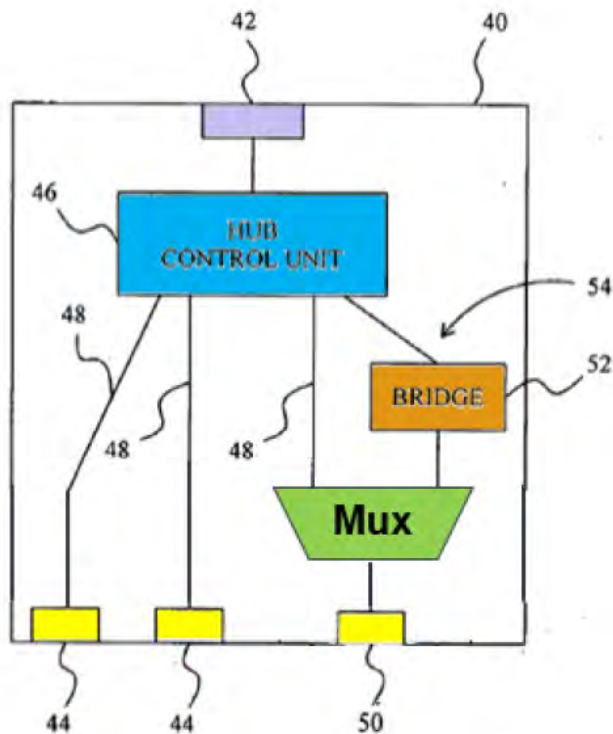


Chang (Hub 40)

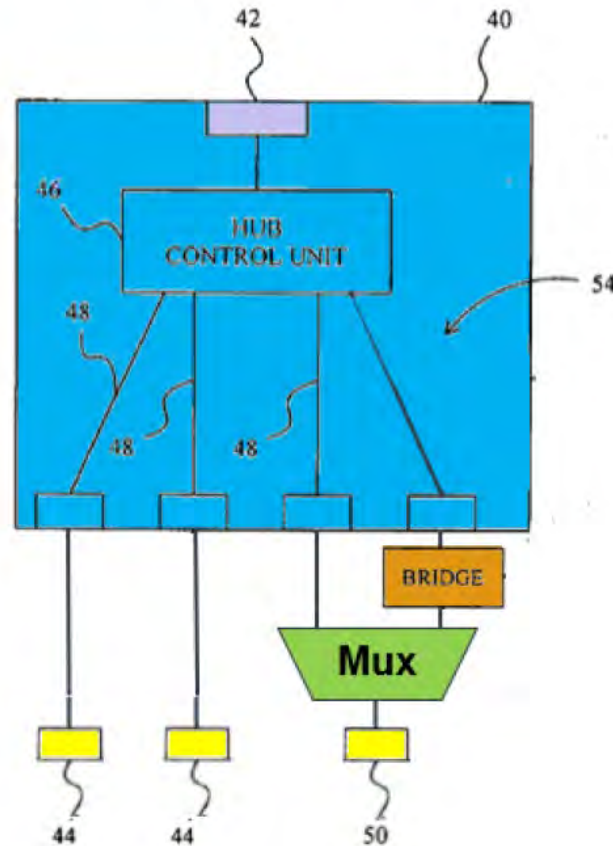


Petitioner Proposes Alternative “Hub 40” and “Hub 46” Invalidity Reads

Chang (Hub 46)



Chang (Hub 40)



MOTIVATION TO COMBINE (CHANG + CHANG II)

A POSITA Would Be Motivated to Combine Chang and Chang II

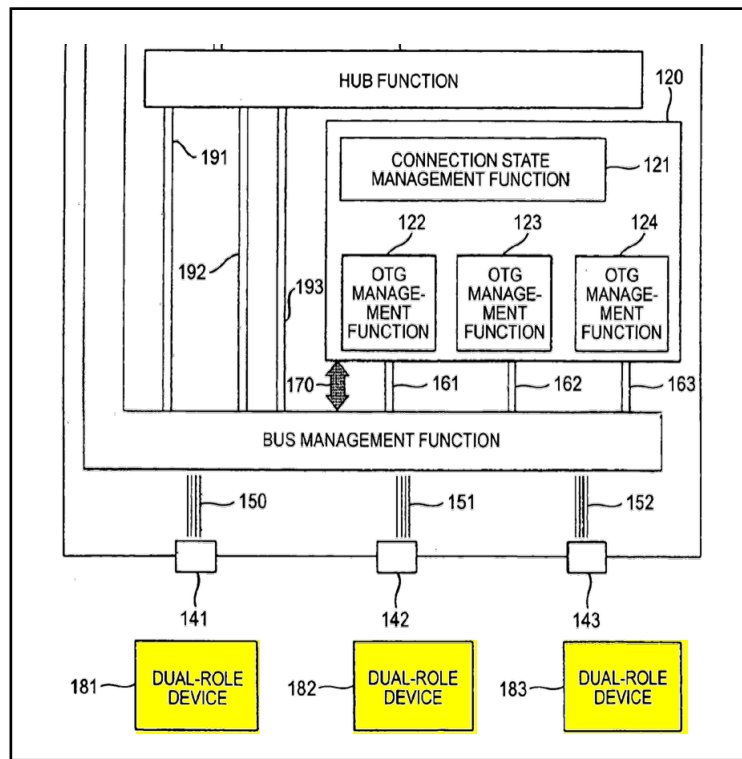
- **Dual-Role Smartphones.** Dual-role smartphones (and other products) were gaining popularity
- **Convenience/Practicality/Safety.**
 - Inconvenient/impractical for consumers to track/know their phone's mode
 - Hassle/impractical to track/know what port(s) support host vs. device mode
 - Unsafe while driving to unplug/replug phone when it changes modes
- **Cost.** Use of dual-role ports save costs
- **Backward Compatibility.** Car-makers often had a host embedded in a component of the vehicle (e.g., head unit / infotainment system)

Dual-role Smartphones Were Gaining Popularity

- The ***Challenged Patents admit*** consumer products (e.g., smartphones and other mobile devices) with ***dual-role USB capabilities were gaining popularity*** before the 2013 priority date. *E.g.*, EX1003 ('420 patent), 2:38-3:3.
- The ***Challenged Patents patents admit*** automakers were “***motivated to adapt to this changing technology,***” i.e., use of dual-role ports to support products dynamically switching between host/device modes. *E.g.*, *id.*, 3:4-67.

Dual-role Smartphones Were Gaining Popularity

- Other references also reflect prevalence of dual-role devices. *E.g.*, Sakaki (EX1053), Fig. 1, [0031]-[0034]



Sakaki (EX1053), Fig. 1 (partial)

[0031] A case where all dual-role devices 181, 182, 183 are connected as USB devices to the USB unit controller will be described. The device control function 120, detecting the connection of a USB cable, records the connection states of the dual-role devices in the connection state management function 121. The device control function 120 then controls

Sakaki (EX1053), [0031]-[0034]

Dual-role Products Were Readily Available

Asus Google Nexus 7 (2013) review: The magnificent seven

GSMarena team, 09 August 2013.

[Asus Google Nexus 7 \(2013\) specs](#) | [User opinions and reviews](#) | [Comments \(27\)](#)

Samsung I9500 Galaxy S4



Acer Iconia Tab A210



EX1065 (various product specs), 4-12

Convenience, Practicality, and Safety

- It was impractical and inconvenient for consumers to:
 - (1) **Know/track what mode** (host or device) their smartphone
 - (2) **Know/track which USB ports** supported host and device mode
 - (3) To **unplug/replug** their smartphone when it switched modes
- Especially in the **automotive context**, requiring a driver to unplug/replug their smartphone while driving would be **unsafe**

Convenience, Practicality, and Safety

several common-sense benefits. It would be impractical and contrary to the goals of the USB specifications, to require consumers that use dual-role products to understand when to switch connections between a dedicated host port (*e.g.*, Chang's port 50) and a dedicated device port (*e.g.*, Chang's port 44). The consumer would not necessarily know when to connect the product to the appropriate port. At the very least, it would be inconvenient for the consumer to have to disconnect and reconnect the product to different ports. Further, dual-role ports save costs.

Welch (EX1013), ¶177

Dual-Role Ports Can Save Costs

Another approach to providing a unit with both Device and Host capability would be to provide multiple ports, including separate Host and Device ports. This approach has a disadvantage in that it requires multiple connectors, multiple ASIC pins and the like.

Needless to say, these approaches add overhead and increase the cost associated with devices that are implemented with both Host and Device functionality.

Castleberry (EX1025), Col. 1:36-43

Backward Compatibility

- Car-makers often had a host embedded in a component of the vehicle (e.g., head unit / infotainment system). *E.g.*, Chutorash (EX1029), 27:26-29 (“Vehicle control system 106 could be classified as an embedded host ...”).

“[T]he car has become a PC on wheels ... The automotive industry does not need to reinvent the wheel: nearly all consumer electronics are PC-dependent for some form of functionality (downloading MP3s, uploading pictures, etc.), and the connection most widely used is USB - so the automotive industry already has a universal standard to take advantage of.

EX1049 (USB In Automotive: No Longer Just For PCs), 1

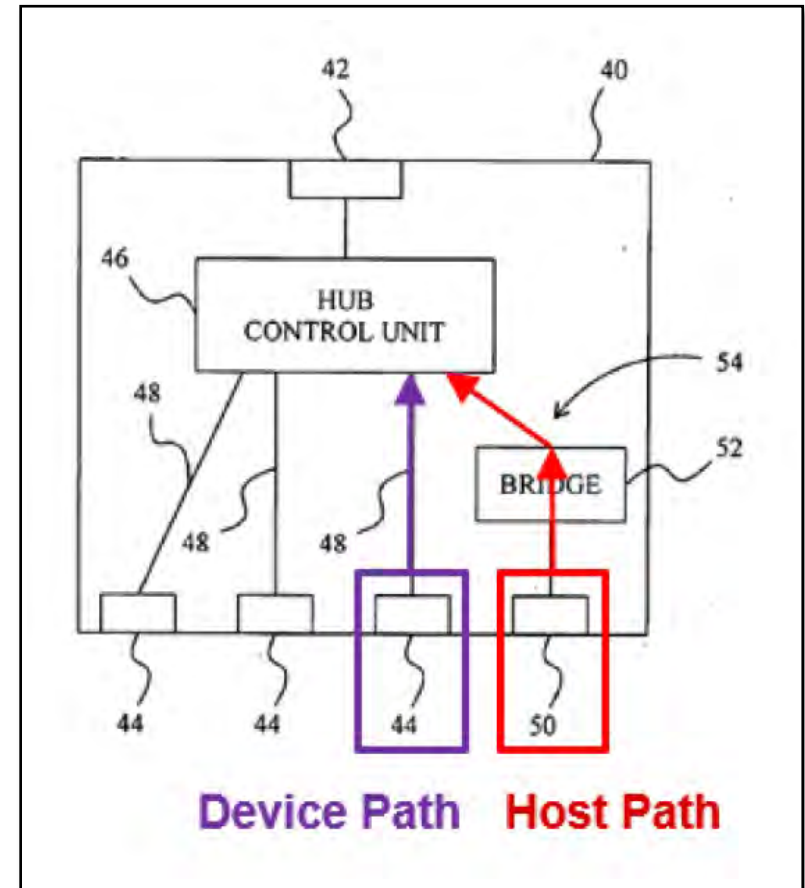
EXPECTATION OF SUCCESS (CHANG + CHANG II)

A POSITA Would Have Had a Reasonable Expectation of Success

- **Roadmap**. Chang provides a roadmap with dedicated host and device paths in a USB hub
- **Well-known Commercial Components**:
 - Dual-role ports (viz., interfaces for connecting dual-role products) and host/device detection were already well-known (and disclosed by Chang II)
 - USB muxes and crossbars were widely available and merely perform their intended function
- **Compatibility**. Compliance with USB standards ensures compatibility.
- **Chang II's Teachings**. Chang II teaches additional details (e.g., use of a host/device detection unit) to control switching between host and device paths

Chang Provides a Roadmap for Dual-Role Ports and Switching

- Chang discloses separate **host-to-host** and **host-to-device** transmission paths
- Chang II discloses **host/device detection** and **switching functionality** using a single USB port. *E.g.*, Chang II (EX1015), Fig. 5.
- Chang II states its relevance to USB hubs. EX1015, [0027] (performs “similar to the commonly known **USB HUB function**”); *id.*, [0040] (“control chip 13 at this time **functions like a USB Hub chip**”)



Chang (EX1014), Fig. 3 (annotated)

USB Muxes/Crossbars Were Well-Known Commercial Components

Your request so far: Function USB Switch (26)

Product Parametric Data

USB Switches (26) View All Parameters Export as Excel Download to PDF

Part Number	Switches Configuration	Number of Switches	Bandwidth	ESD	Package Type	Function	Select All/None
NEW FSA9285	MCPC Compliant USB Port Multimedia Switch with Accessory Detection	SPDT	2	5.0	ML-CSP	Multimedia Switch	☐
NEW FSA880	USB Port 2:1 Switch with Accessory and Charger Detection	2:1	1	15.0	USB-P	USB Switch	☐
NEW FSUSB74	High Speed USB 2.0 Switch/Multiplexer	4:1	1	3.0	ML-P, USB-P	USB Switch	☐
NEW FSUSB73	High Speed USB 2.0 Switch/Multiplexer	4:1	1	3.0	USB-P	USB Switch	☐
NEW FSA831	USB2.0 High-Speed (480Mbps) Charger Detection with Isolation Switch	2:1 with Charge Detection	2	15.0	MicroPak	USB Switch	☐
NEW FSA881	USB Port 2:1 Switch with Accessory and Charger Detection	2:1	1	15.0	USB-P	USB Switch	☐
FSUSB42	Low Power, Two-Port, Hi-Speed USB2.0 (480Mbps) Switch	DPDT	1	750.0	MicroPak, USB-P	USB Switch	☐
FSUSB30	Low Power 2-Port Hi-Speed USB 2.0 (480 Mbps) Switch	DPDT	1	750.0	20Pin MicroPak, MicroPak, USB-P	USB Switch	☐
FSA221	Multimedia and USB 2.0 Hi-Speed and Audio Switches w/ Negative Signal Capability	DPDT	1	750.0	MicroPak, MicroPak, USB-P	Multimedia Switch	☐
FSA223	Multimedia and USB 2.0 Hi-Speed and Audio Switches w/ Negative Signal Capability	DPDT	1	750.0	MicroPak, MicroPak, USB-P	Multimedia Switch	☐
FSA9280A	USB 2.0 Accessory Detection Switch w/ 28V FET	1:1 with Charge Detection	1	750.0	USB-P	Multimedia Switch	☐
FSUSB31	Low Power Dual SPST Hi-Speed USB 2.0 (480 Mbps) Switch	SPST	2	750.0	MicroPak, USB-P	USB Switch	☐
FSUSB63	3:1 HS - USB Switch / Multiplexer	3:1	1	400.0	USB-P	USB Switch	☐
FSUSB11	Low Power Full Speed USB Switch	SPDT (indirect)	2	950.0	ML-CSP	USB Switch	☐
FSUSB45	Hi-Speed USB2.0 (480Mbps) Switch w/Dedicated Charger Port Detect	DPDT	2	750.0	MicroPak	USB Switch	☐
FSA9288A	USB 2.0 Accessory Detection Switch w/ 28V FET	1:1 with Charge Detection	1	750.0	ML-P	Multimedia Switch	☐
FSUSB20	Low Power 1 Port Hi-Speed USB (480Mbps) Switch	DPDT	2	750.0	DGPH, MicroPak, MicroPak	USB Switch	☐
FSUSB22	Low Power 2 Port Hi-Speed USB 2.0 (480Mbps) Switch	SPDT	4	800.0	DGPH, MicroPak, MicroPak	USB Switch	☐
FSUSB46	Hi-Speed USB2.0 (480Mbps) DPST Switch with Dedicated Charger Port Detection	DPST	2	750.0	MicroPak, USB-P	USB Switch	☐
FSUSB23	Low Power Hi-Speed USB 2.0 (480 Mbps) Switch	DPDT	1	750.0	DGPH, MicroPak	USB Switch	☐
FSUSB40	Low Power, Two-Port, Hi-Speed USB2.0 (480Mbps) Switch	DPDT	1	750.0	MicroPak, USB-P	USB Switch	☐
FSA201	Multimedia, USB 2.0 and Audio Switch	DPDT	2	200.0	MicroPak	Multimedia Switch	☐
FSA2000	Auto Selecting HS-USB Switch with Cap-Free Headphone Audio Amplifier	USB and Headphone Amplifier	2	750.0	ML-P	Multimedia Switch	☐
FSA203	Multimedia, Hi-Speed USB, Video, and Negative Swing Audio Switch with Video Amp/Filter	DPDT	1	750.0	DGPH	Multimedia Switch	☐

NEW FSUSB74 High Speed USB 2.0 Switch/Multiplexer

NEW FSUSB73 High Speed USB 2.0 Switch/Multiplexer

NEW FSA831 USB2.0 High-Speed (480Mbps) Charger Detection with Isolation Switch

NEW FSA881 USB Port 2:1 Switch with Accessory and Charger Detection

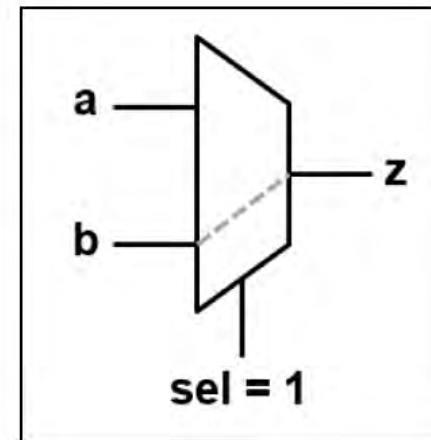
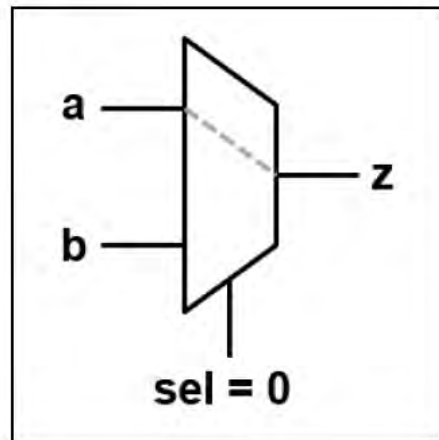
FSUSB42 Low Power, Two-Port, Hi-Speed USB2.0 (480Mbps) Switch

FSUSB30 Low Power 2-Port Hi-Speed USB 2.0 (480 Mbps) Switch

EX1059 (Product Listing), 1

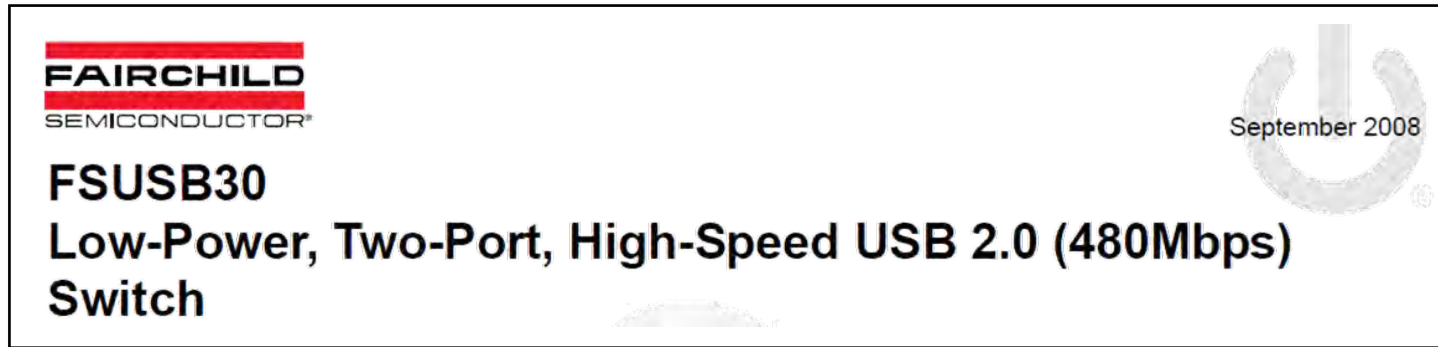
USB Muxes/Crossbars Merely Perform Their Intended Signal Routing Function

¶88. For example, the well-known 2:1 multiplexing switch, shown below, enables connecting either signal “a” or “b” to signal “z” via the “sel” (select) control signal. *Id.*, ¶89.

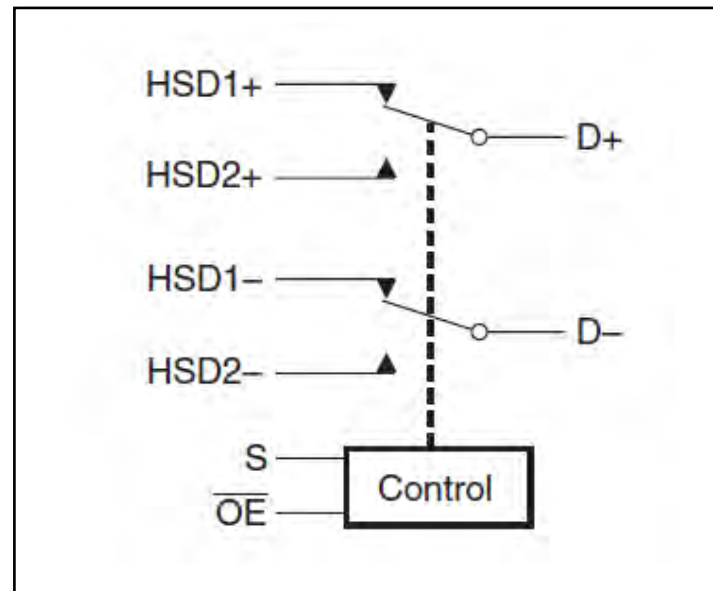


-228 Petition (Paper 1), 10
(showing mux routing)

USB Mux/Crossbar Operation is Simple and Well-Known



EX1068 (USB Mux Datasheet), 1



EX1068 (USB Mux Datasheet), 2

USB Muxes/Crossbars Were Very Well-Known

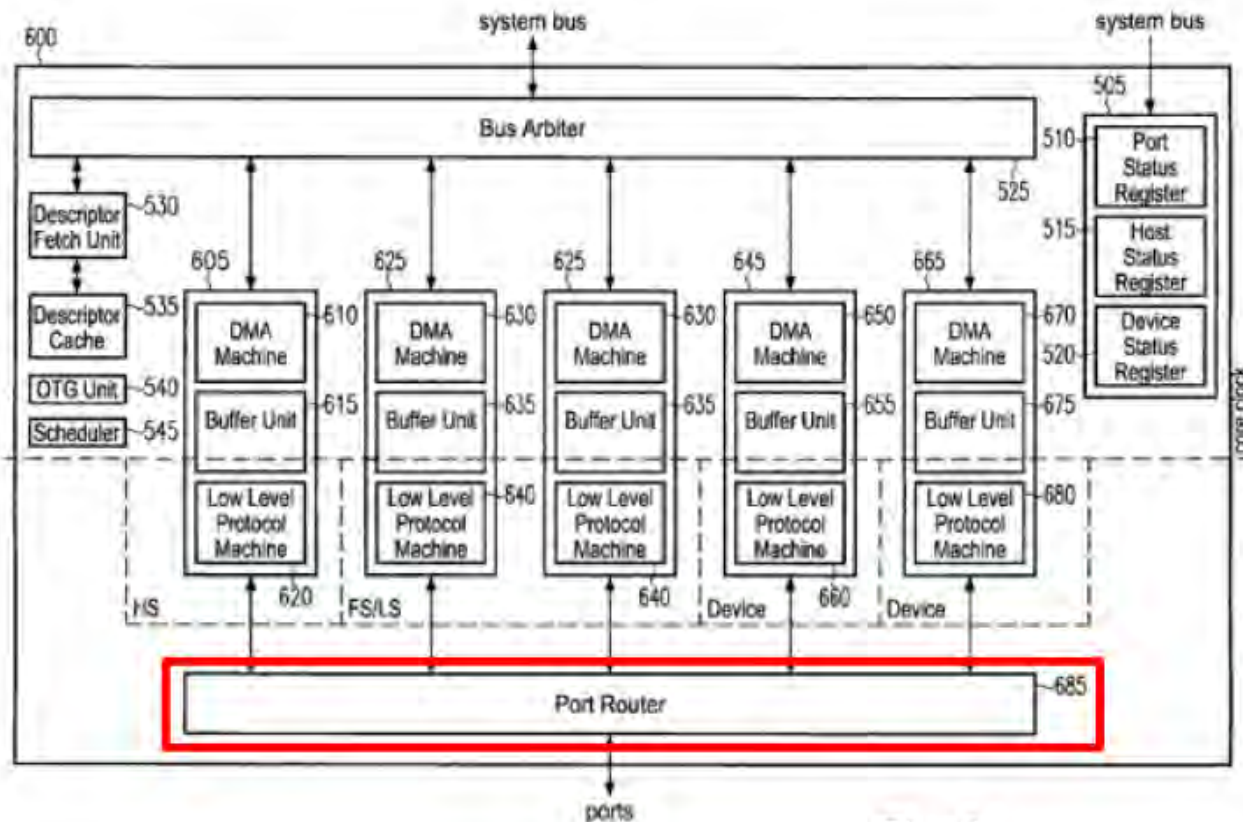


Fig. 6

Hesse (EX1017), Fig. 6 (annotated)

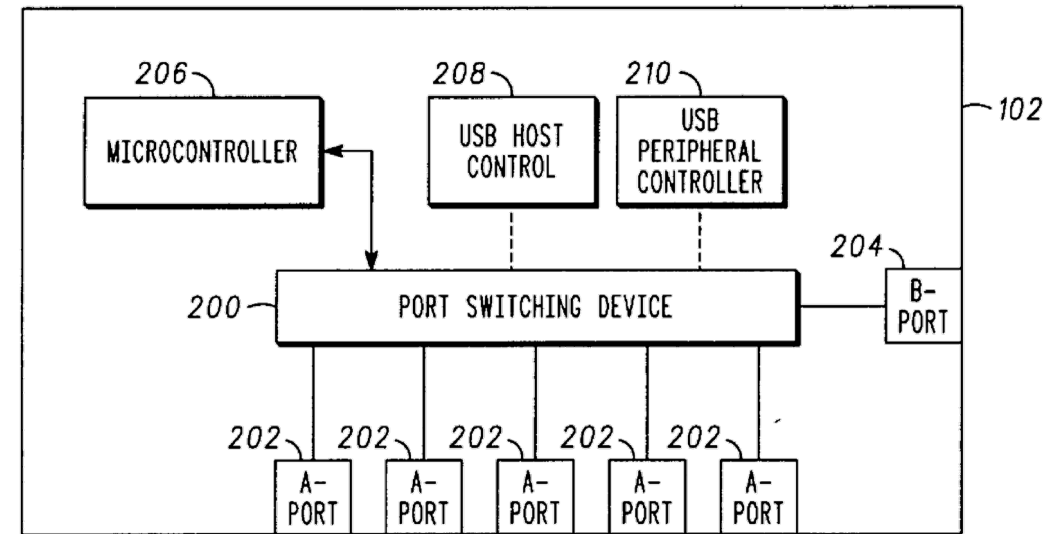
[0057] Further, the device 600 of FIG. 6 has a port router 685 which may be implemented as crossbar switch for assigning each physical port to the respective port handler. It is noted that the present embodiment allows one port handler unit 605, 625, 645, 665 to operate more than one physical port.

Hesse (EX1017), [0057]

USB Muxes/Crossbars Were Very Well-Known

[0024] A block diagram of an example OTG hub 102 is illustrated in FIG. 2. The hub 102 includes a port switching device 200 that serves to physically switch signals between a plurality of A-type ports 202. Additionally, a B-type port 204 may be included and connected to the port switching device 200. This B-type port 204 is an override port to which

Overtoom (EX1016), [0024]



Overtoom (EX1016), Fig. 2

Aptiv Admits USB is Not an “Unpredictable Art”

Petitioner’s primary contention relates to its scope—Petitioner asserts that the term lacks written description support because the specification “provides no structural description” of how the USB routing switch might include the signal detection circuit. (Pet., 102.) Against the field of USB, which is *not* an unpredictable art, Petitioner’s assertion rings hollow. ((EX-2001, ¶ 120); *see also*

-011 POPR (Paper 9), 60

Compliance with USB Standards Ensures Compatibility

(57)

ABSTRACT

A data transmission bridge device for transmitting data that adheres to USB specification for transmitting data and includes: a first connecting interface, a second connecting

Chang II (EX1015), Abstract

Features

Switch Type	3:1 USB Switch
USB	USB 2.0 High-Speed & Full-Speed Compliant
Break-Before-Make Time	126µs
R _{ON}	6Ω Typical
C _{ON}	6pF Typical
Bandwidth	830MHz

EX1060 (USB Mux Datasheet), 1

USB is the most successful PC peripheral interconnect ever defined and it has migrated heavily into the CE and Mobile segments. In 2006 alone over 2 billion USB devices were shipped and there are over 6 billion USB products in the installed base today. End users “know” what USB is. Product developers understand the infrastructure and interfaces necessary to build a successful product.

EX1023 (USB 3.0 Spec), 29

-228 Petition (Paper 1), 4-5, 10 (citing EX1060 (USB Mux Datasheet));
Reply (Paper 30), 3-4 (citing EX1023 (USB 3.0 Spec), 29, Chang II (EX1015))

Chang Confirms a Reasonable Expectation of Success

[0024] A USB hub according to the present invention can overcome the drawback of conventional USB hubs that lack host-to-host transmission function. The present invention can be implemented merely by integrating or adding a bridge to a USB hub, and thus does not require too many modifications on the current hub control unit. Therefore, the derived cost is relatively low, while a multi-functional USB hub with a host-to-host transmission function is obtained.

Chang (EX1014), [0024]

A POSITA Would Have Had a Reasonable Expectation of Success



189. Chang II also details detection functionality with a “*detection unit 134*” that is part of the bridge’s “*control chip*.” EX1015 (Chang II), Figs. 1, 5, [0034]. Chang II refers to an “*inquire*” signal as part of its detection functionality. The detection unit detects the connection of a host or device by (1) sending an “*inquire signal*” and receiving a response (when a host connects) or (2) receiving an “*inquire signal*” (when a device connects). *Id.*, [0038]-[0040]. The detection unit then produces either a “*bridging detection signal*” (after detecting a host) or “*slave detection signal*” (after detecting a device). *Id.* These “*inquire signal[s]*” refer to the Host/Device Detection techniques that I discuss in §VLB.1.

-228 EX1013 (Welch), ¶189 (discussing/quoting Chang II)

REBUTTAL TO APTIV'S MOTIVATION TO COMBINE ARGUMENTS

Aptiv's Motivation to Combine and Expectation of Success Arguments Fail

- **Hindsight**. Aptiv's "hindsight" argument (-228 POR, 53) that Mr. Welch read the patent before the prior art fails
- **Redundancy/Cost**. Aptiv's argument that ""combination is wasteful and inefficient" because it "adds duplicative switching components." POR, 57-58.
 - But Chang has no "switching components" so there is nothing "duplicative" about adding a crossbar."
- **Inoperability**. Aptiv's "inoperability" arguments (-228 POR, §§VII.E.1 and VII.E.4) just reprise its "dead end" argument and fail for the same reasons

Aptiv's "Hindsight" Argument Fails

PO also argues hindsight because Mr. Welch read the patent before the prior art. POR, 53. Experts routinely do this to determine if they are comfortable/qualified in the patented subject matter and has nothing to do with hindsight. Moreover, PO's own expert follows the same approach PO criticizes. EX1084, 28:12-29:23.

-228 Reply (Paper 30), 21

Aptiv's "Redundancy" Argument Fails

- Aptiv argues the “combination is **wasteful and inefficient**” because it “**adds duplicative switching components.**” POR, 57-58
- But Chang has **no “switching components”** so there is **nothing “duplicative”** about adding a mux or crossbar. Reply, 21
- Aptiv argues the combination is redundant and costly because it “**introduces additional ports** (44, 50) to Chang’s USB hub.” POR, 59
- But Chang’s modified hub **reduces port count** from 4 ports down to 3. Reply, 21
 - See Castleberry (EX1025), 1:36-43 (separate host/device ports “add overhead and increase the cost”)

Aptiv's "Cost" Argument Fails

Integrating crossbar functionality into an ASIC adds *de minimus* cost.

EX2021, 29:20-30:2; Welch, ¶¶96, 201-202. Chang recognizes integration was known to “an [IC] designer.” EX1014, [0022]. Chang II integrates substantially all components on a single “control chip 13” in Fig. 2. EX1015, [0023], [0034], Fig. 2. Hesse discloses a “crossbar switch” on the same chip as the USB controller. EX1017, [0057]-[0059]. Using discrete mux/crossbar components would be obvious to try for rapid development/prototyping and fast time-to-market, even if marginally more expensive. Welch, ¶¶201-202; EX2021, 235:19-236:22 (discussing cost/benefit tradeoff).

-228 Reply (Paper 30), 22-23

Arendi Does Not Support Aptiv

- Citing *Arendi*, Aptiv asserts POSITA knowledge cannot supply a missing element or play any role in motivation to combine (Sur-reply, 22)
- But *Arendi* is inapposite
 - *Arendi* concerned using unsupported “common sense” to supply a missing element
 - Microchip never uses “common sense” to supply a missing limitation
 - Microchip provides reasoned evidence and explanation for its motivation to combine

The single question at issue here is whether the Board misused “common sense” to conclude that it would have been obvious to supply a missing limitation in the Pandit prior art reference to arrive at the claimed invention. It is true that common sense and common knowledge have their proper place in the obviousness inquiry. We stated in *Perfect Web* that “[c]ommon sense

Arendi S.A.R.L. v. Apple Inc., 832 F.3d 1355, 1361 (Fed. Cir. 2016)

The “use of common sense does not require a ‘specific hint or suggestion in a particular reference,’ only a reasoned explanation that avoids conclusory generalizations.” *Perfect Web*, 587 F.3d at 1329 (quoting *DyStar*, 464

Id., 1366

REBUTTAL TO APTIV'S “DEAD END” ARGUMENT

Aptiv's "Dead End" Argument is a Strawman

- Petitioner's opening papers disclosed several detection unit locations, none of which have a "dead-end" problem
 - Outside the switch and bridge
 - Inside the switch (mux/crossbar)
 - Inside the bridge (connected per Chang II's teachings)
- Aptiv reframes how the combination works to manufacture a strawman "dead-end" argument
- Even under Aptiv's false premise, the combination works fine when taking into account reset principles in the USB spec

Host/Device Detection was Very Well-Known

- Castleberry (and others) describe various “suitable way[s]” for performing host/device detection. *E.g.*, 7:30-52
- Mr. Welch discusses host/device detection in detail. Welch, ¶¶74-87
- The challenged patents say nothing about a signal detection unit (presumably because it was so well-known to POSITAs)
- Chang II expressly discloses a “detection unit” (Chang II, Fig. 5, [0013], [0034]; Welch, ¶159)

Castleberry (EX1025)

- **U.S. Pat. 8,683,085 to Castleberry**
- **Title:** “USB Interface Configurable for Host or Device Mode”
- **Filed:** May 1, 2009

(12) United States Patent		(10) Patent No.:	US 8,683,085 B1
Castleberry et al.		(45) Date of Patent:	Mar. 25, 2014
(54)	USB INTERFACE CONFIGURABLE FOR HOST OR DEVICE MODE		
(75)	Inventors: Jim Castleberry , Boise, ID (US); David Luke , Boise, ID (US)	5,802,131 A 5,815,447 A 5,875,470 A 5,953,340 A 5,996,051 A 6,021,086 A 6,034,957 A 6,067,301 A 6,081,528 A 6,115,389 A 6,160,814 A 6,167,491 A 6,216,205 B1 6,230,191 B1 6,370,624 B1 6,446,173 B1 6,487,207 B1 6,535,939 B1 6,535,963 B1	9/1998 Morzano 9/1998 Thomann 2/1999 Dreifelbis et al. 9/1999 Scott et al. 11/1999 Mergard 2/2000 Joffe et al. 3/2000 Haddock et al. 5/2000 Aatresh 6/2000 Thomann 9/2000 Mahale et al. 12/2000 Ren et al. 4/2001 Chin et al. 5/2001 Walker 4/2002 Ajanovic et al. 9/2002 Pham 11/2002 Thomann 3/2003 Arinilli et al. 3/2003 Rivers
(73)	Assignee: Marvell International Ltd. , Hamilton (BM)		
(*)	Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 200 days.		
(21)	Appl. No.: 12/434,000		
(22)	Filed: May 1, 2009		

Step 500 determines whether a USB unit is to operate in a Host or a Device mode. This step can be performed in any suitable way. For example, a USB unit might select Host or Device mode based on a choice by the user, e.g. a button press. Alternately or additionally, the USB unit can passively monitor the signaling which another USB unit presents on VBUS, D+, and D- after the USB cable is connected, determine if the other USB unit is acting as a Host or Device, and then choose the alternate mode to allow for communication (e.g., choose Host mode if the other unit is acting in the Device mode and vice versa). Alternately or additionally, the USB unit can actively drive Host signaling onto the USB interface after connection, determine if the other USB unit responds, and if not then select the other mode. Alternately or additionally, mode selection can also be based on the USB connection. For example, OTG utilizes an ID pin in the connector to tell whether the unit is connected as a Host or Device. External hardware, such as a controller, can read the state of a pin, where the pin could be tied high to select one mode and tied low to select the other mode. Mode selection can also be implemented using internal hardware such as an internal ROM or fuse bit, or through embedded software that uses a value programmed into boot ROM.

Castleberry (EX1025), Col. 7:30-52

Petitioner's Proposed Combination Includes a Detection Unit

product is device). *Id.*, Figs. 1, 5, [0013]. And Chang II further discloses “detection unit 134” for detecting whether the consumer product is host or device. *Id.*, [0038]. Accordingly, a POSITA would have been motivated, with a high expectation of success, to route the dual-role ports (and products attached thereto) to the appropriate path using a switch.¹¹ Two obvious implementation options for modifying Chang Fig. 3 are shown below. Welch, ¶¶188-192. The

-228 Petition (Paper 1), 37-38

Petitioner Disclosed Several Obvious Locations for the Detection Unit

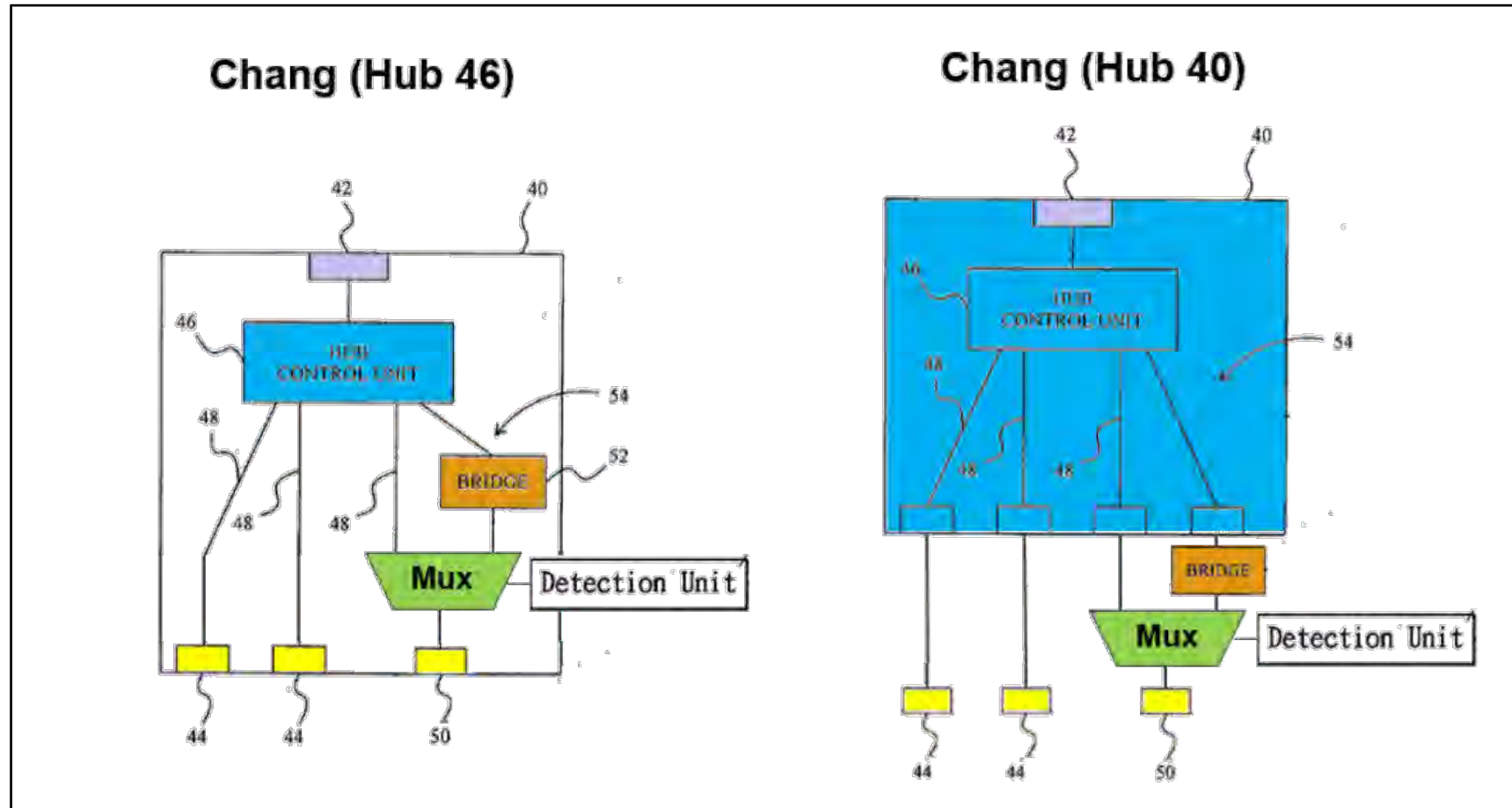
- Petitioner's opening papers disclosed **several detection unit locations**, none of which have a “dead-end” problem
 - Outside the switch and bridge
 - Inside the switch (mux/crossbar)
 - Inside the bridge (and connected per Chang II's teachings)
- Petitioner provided **more detail** than the Challenged Patents

Petitioner's Proposed Combination Includes a Detection Unit

¹¹ It would have been routine and obvious for the detection unit and/or bridge to control the switching functionality. Welch, ¶¶192-193. Chang II's bridge controls routing, viz., "Bridge Device 1" in Fig. 1 includes "control chip 13" (shown in Fig. 5) with "detection unit" (134) and CPU (135). EX1015, [0022]-[0023], [0034]. Accordingly, in view of Chang II and the knowledge of a POSITA, it would have been obvious for Chang's bridge and/or detection unit to control, e.g., the select lines of the switch. Welch, ¶¶192-193; *see also* §III.B.1, §III.B.2.

-228 Petition (Paper 1), 38

Petitioner's Proposed Combination Includes a Detection Unit



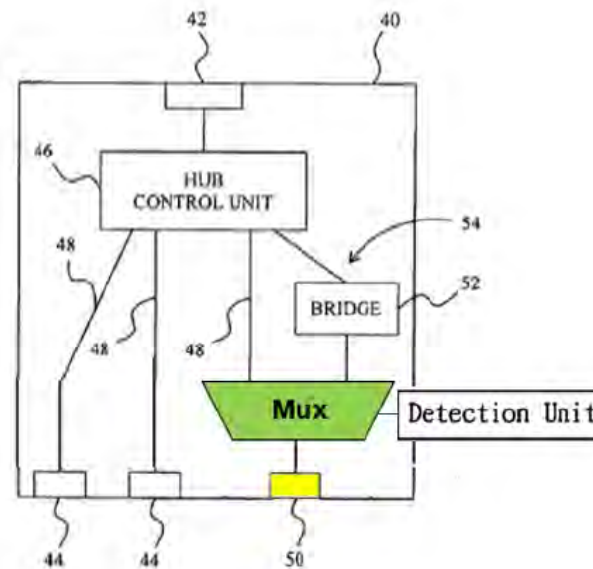
-011 Petition (Paper 1), 49

Mr. Welch Discusses Detection Unit Placement



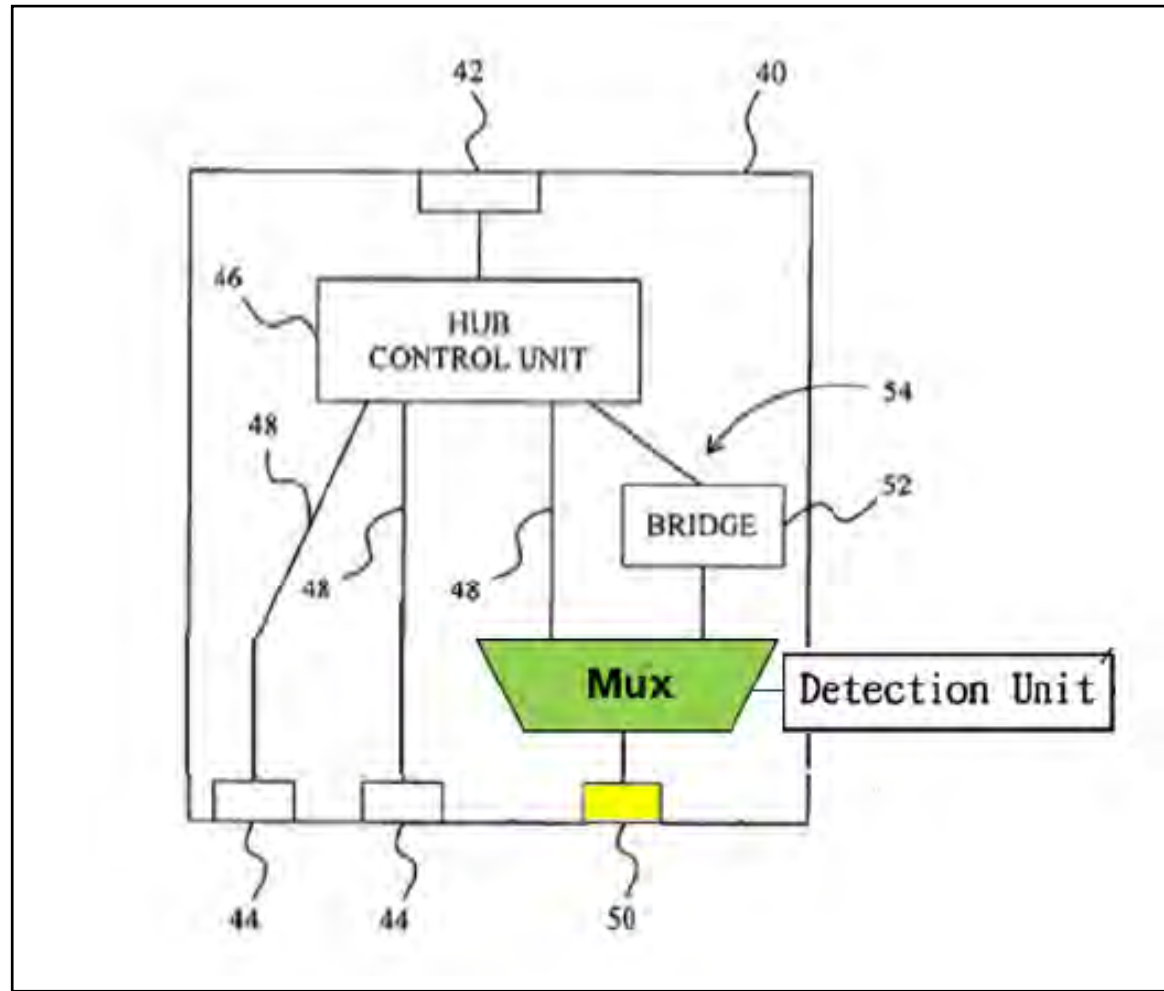
192. As I describe above, detection circuitry is necessary to detect the mode of the dual-role product, which then causes selection of the appropriate path. An example deployment of a detection unit (e.g., in view of Chang II) is shown in the

Mux Implementation:



-228 Welch (EX1013), ¶¶192

The Proposed Combination's Detection Unit



-228 Welch (EX1013), ¶¶192

Mr. Welch Discusses Detection Unit Placement



193. This detection circuitry could be deployed in several obvious ways. In the example above it is associated with the mux. In another obvious example, it could be separate and between the dual-role port 50 and mux. This location is obvious because it is the first place a signal from a downstream USB product arrives. In a third obvious location, it could be located in the bridge to take advantage of existing logic and circuitry to, for example, process the output of the detection circuit in a manner similar to Chang II's CPU 135 (EX1015 (Chang II), [0038], Fig. 5). It

-228 Welch (EX1013), ¶¶193

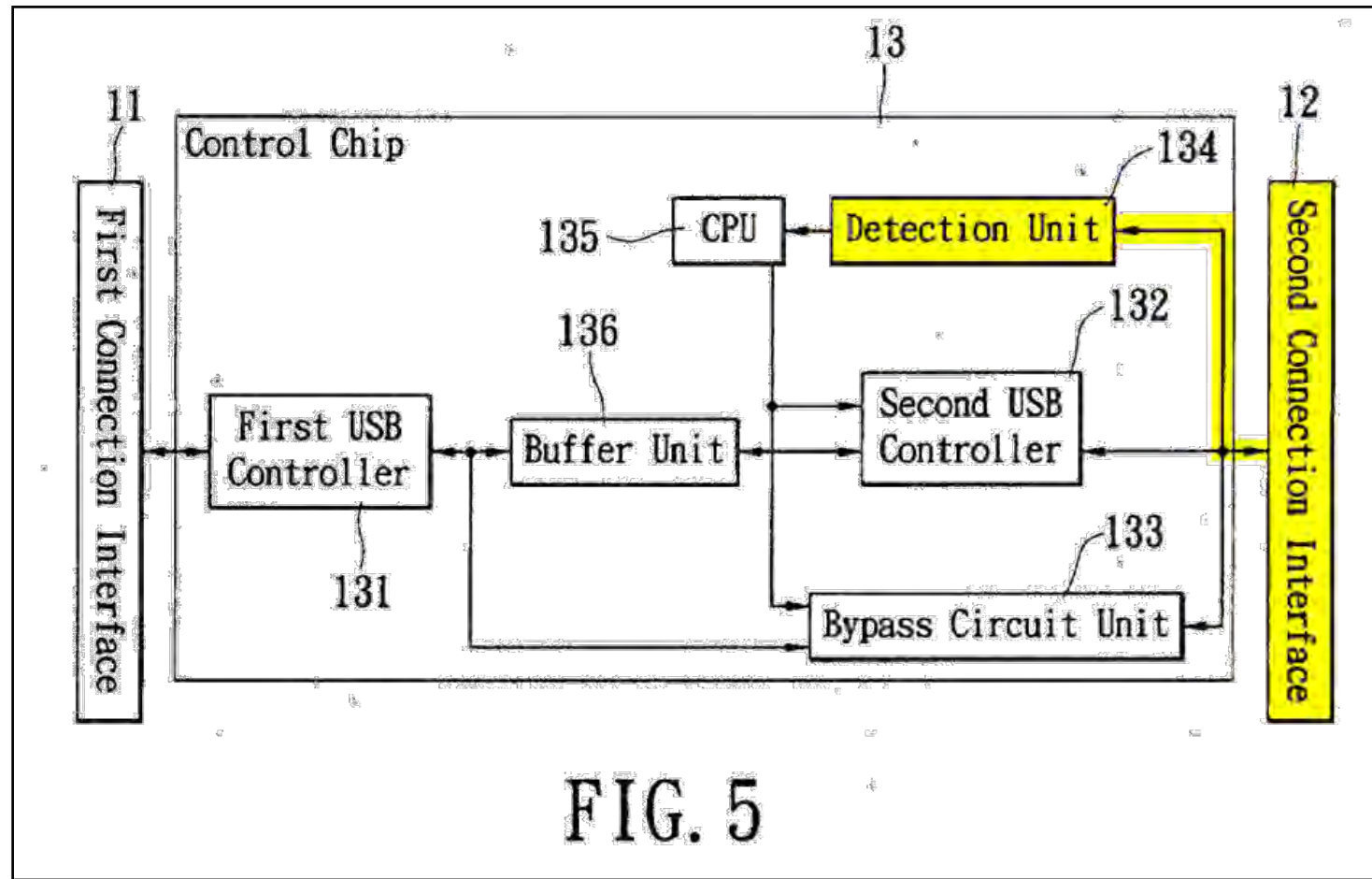
Mr. Welch Explains the Detection Unit Connection to the USB Port



control the switching functionality. For example, as I describe above, Chang II's bridge includes a "*detection unit*" (in the control chip) that detects the mode of the downstream product for selection of the appropriate transmission path. *Id.*, [0022]-[0023], [0034]. The above illustrates the detection unit connected to the mux to show that host/device detection ultimately controls the mux's select line. Additionally, the detection unit must connect to the downstream port to detect the mode, as shown in Chang II. *Id.*, Fig. 5.

-228 Welch (EX1013), ¶¶193

Chang II Teaches the Detection Unit Connected to the Port



Chang II (EX1015), Fig. 5 (annotated)

The Detection Unit Can Be Located In the Switch

written description support. For prior art analysis purposes, Petitioner applies an interpretation in which a single IC or chip containing the routing switch and signal detection circuit is within the claim scope.¹⁶ Both Mux Implementations render this interpretation obvious.

The analysis under §VII.A.1 element 1[c], and element 1[d][i] demonstrate both Mux Implementations render obvious a switch and signal detection circuit. It would further be obvious to include these on a single IC. Welch, ¶¶268-274. First, Chang teaches integrating additional components onto a single IC. EX1014,

-011 Petition (Paper 1), 73

Dr. Houh Admits “Signal Detection Circuit” Location was “Design Choice”



116. Given that some claims require the routing switch to include the signal detection circuit whereas others do not, a POSITA would understand that the location of the signal detection circuit was a matter of design choice. Because of the functional relationship between the signal detection circuit and the routing switch, it would be natural to implement a routing switch that includes the signal detection circuit. The method of claims 4 and 9 could be performed with such a

EX2001 (Houh), ¶116

Dr. Houh Admission re “Detection Circuit” Location



121. The same applies to the “including” requirement; separate circuits are frequently combined with predictable results. For example, to perform analog-to-digital conversion, a microcontroller could interface with an analog to digital converter, or it may just as easily include an analog to digital converter circuit.

There is no reason to think that known detection circuits could not be included in a routing switch.

-228 EX2001 (Houh), ¶121

Dr. Houh Admits “Signal Detection Circuit” Location was “Design Choice”



system, assuming the other limitations were met. Alternatively, the signal detection circuit could be located elsewhere while still performing the claimed method of the independent claims. As a practical matter, it would be easy for a POSITA to implement either configuration in view of the '643 patent's disclosures and a POSITA's knowledge of the art.

EX2001 (Houh), ¶116

Dr. Houh Admits Operability



120. Moreover, in the art of electrical engineering, circuits can be combined with predictable results. For example, because circuits behave predictably when combined, a POSITA could select a desired circuit from the class of signal detection circuits and expect it to work with a given routing switch.

Conversely, a variety of routing switches could be used to route the signals in accordance with a determination by a signal detection circuit.

-228 EX2001 (Houh), ¶120

Dr. Houh Had No Opinion with the Detection Unit Outside the Bridge



20 Q. Let me ask this question, Dr. Houh. Did you
21 analyze a scenario where the detection unit is located
22 outside of the bridge 52 in your declarations?

23 MR. BLUMENKOPF: Objection, form.

24 A. Well, I mean, the main focus of my declaration
25 was to respond to -- of the analysis was responding to
1 the actual combination that petitioner set forth in the
2 challenges in which that specific combination relied on
3 the bridge and the detection unit inside the bridge.

EX1085 (Houh Tr.), 256:20-257:3

Dr. Houh Had No Opinion with the Detection Unit Outside the Bridge



15 Q. Can you point me to anywhere in any of your
16 declarations where you analyze a scenario where the
17 detection unit is located outside of the bridge 52?

18 MR. BLUMENKOPF: Objection, form.

19 BY MR. JENSEN:

20 Q. In the interest of time and since you haven't
21 been able to find anything just yet, let me ask a
22 different question. I think you mentioned this a couple

EX1085 (Houh Tr.), 257:15-22

None of Petitioner's Detection Unit Locations has a "Dead End" Problem

- Petitioner disclosed several detection unit locations, **all of which connect to the downstream port**
 - Outside the switch and bridge
 - Inside the switch (*viz.*, co-located with the mux/crossbar)
 - Inside the bridge (and connected per Chang II's teachings)
- Because the detection unit in Petitioner's combination (regardless of its placement) always connects to the downstream port it can always perform host/device detection and **no "dead end" problem exists**
- **Aptiv reframes how the combination works** to manufacture a strawman "dead end" argument

Aptiv Reframes the Combination to Manufacture a “Dead End” Argument

Aptiv's "Dead End" Argument Relies on a False Premise

2. PO's Dead-End Argument Relies on a False Premise

PO's dead-end argument—in all its incarnations—relies on the same false premise: that host/device detection takes place in the bridge using USB signals from the crossbar. *E.g.*, POR, 24. This is fatal to PO's argument. Welch Reply,

-228 Reply (Paper 30), 8-10

Aptiv's "Dead End" Argument Relies on a False Premise

- Aptiv's false premise would **read out Petitioner's use of discrete, off-the-shelf bridge components** unit (-228 Reply (Paper 30), 9)
- Aptiv's false premise **contradicts its district court position** that "[a POSITA] would understand that [host/device detection] is performed by the USB routing switch" EX1072, 597
- Dr. Houh admitted detection unit placement was **merely "a matter of design choice"** and that "it would be easy for a POSITA" to place the detection circuit "elsewhere while still performing the claimed method" EX2001, ¶116

Aptiv's Attempt to Reframe the Combination

¹ In his declaration in a parallel proceeding, Petitioner's expert offered additional detail, explaining that "in view of the teachings of Chang II, the bridge in Chang would have been understood to include a controller, CPU, or similar logic (as disclosed in Chang II's bridge control chip 13) for controlling routing"; and further, that "it would have been obvious and advantageous to use existing logic/resources on a bridge chip (such as the control chip 13 in Chang II) to save costs." (EX2043, ¶¶270-71.)

-011 Sur-reply (Paper 40), 4

Aptiv's Attempt to Reframe the Combination Fails

- Aptiv's argument (on previous slide) fails because the cited passage refers to **'420 dependent claim 6**
- That dependent claim expressly requires ***"the USB bridge is configured to control the USB routing switch"*** ('420 claim 6)
 - The '420 Petition showed how the proposed combination met this requirement
 - But the limitation says nothing about a detection unit or its location/operation
- By contrast, **dependent claim 4 in the '643 patent** specifies that **"the USB routing switch includes the signal detection circuit"**
 - The '643 Petition explains placing the detector in the mux/crossbar (which Dr. Houh agrees is a "natural" location) which confirms Petitioner did not limit detector placement to inside the bridge

Aptiv's Attempt to Reframe the Combination Fails

- Dr. Houh's POPR testimony re placing the detector inside the switch (and thus outside the bridge) exposes Aptiv's position as disingenuous



location of the signal detection circuit was a matter of design choice. Because of the functional relationship between the signal detection circuit and the routing switch, it would be natural to implement a routing switch that includes the signal detection circuit. The method of claims 4 and 9 could be performed with such a system, assuming the other limitations were met. Alternatively, the signal

EX2001 (Houh), ¶116

The Combination Works Even When Connected as Aptiv Proposes

The Combination Works Fine Even When Connected as Aptiv Proposes

- **Even accepting Aptiv's false premise, the combination works fine** when taking into account **basic reset principles** in the USB standard
- Aptiv's argument incorrectly presumes there is no reset/default/initialization condition for USB connections and hubs
- Aptiv ignores the **fundamental USB concepts of "Attachment" and "Removal"** that define the signaling used (including reset) when opening/closing a USB connection
- Applying the **basic concept of reset to Chang's mux/crossbar** resolves the purported "dead end" problem

The Combination Works Fine Even When Connected as Aptiv Proposes

Even if the detection unit performed host/device detection on USB signals from the crossbar as PO incorrectly assumes (instead of directly from the downstream port), a POSITA would understand the combination still works, provided the crossbar reverts to a default state (*viz.*, routing to the bridge) when a mode change occurs. Welch Reply, ¶¶44-57. To begin, Dr. Houh admitted

-288 Reply (Paper 30), 12

Dr. Houh Recognizes the Combination Has a Default State



20 The issue with the combination that I've
21 analyzed is that in the proposed combination by the
22 petitioner, once it's determined the first time that a
23 device type has been connected to the appropriate port
24 that is initially going into the bridge, then subsequent
25 to that, the -- that device is set up to bypass the
1 bridge, and there can be no subsequent detections of any
2 change in what's plugged into that port after that time
3 of the switch.

EX1084 (Houh Tr.), 197:20-198:3

Dr. Houh Admits the Combination Can Switch from Host to Device Path



20 The issue with the combination that I've
21 analyzed is that in the proposed combination by the
22 petitioner, once it's determined the first time that a
23 device type has been connected to the appropriate port
24 that is initially going into the bridge, then subsequent
25 to that, the -- that device is set up to bypass the
1 bridge, and there can be no subsequent detections of any
2 change in what's plugged into that port after that time
3 of the switch.

EX1084 (Houh Tr.), 197:20-198:3

Dr. Houh Admits the Combination Can Switch from Host to Device Path



23 Would you agree with me that the modified
24 version of Chang could switch from a host-to-host path
25 to a host-to-device path, but it could not switch back?

1 MR. BLUMENKOPF: Objection, form.

2 A. It could switch from the communication path
3 internally in the proposed combination at first going
4 through the bridge, as I've illustrated in the figure in
5 86 of the '643 declaration. I think there's similar
6 figures and description in the other supplemental
7 declarations as well.

EX1085 (Houh Tr.), 262:23-263:7

Electrically Closing a Connection (“Removal”) Triggers Reset

Per USB requirements, an existing connection is closed (but not necessarily unplugged) before a new connection is established (Attachment). EX1018, §§4.6.1, 4.6.2, 9.2.1; Welch Reply, ¶¶12-14, 17. Thus, when switching modes, the downstream USB product first closes its existing connection by sending an SE0 signal which the receiving port “may treat...as a reset.” EX1018, §§7.1.7.5, 7.1.7.3; Welch Reply, ¶¶9-10, 16.

-288 Reply (Paper 30), 13-14

Physical Disconnection is Unnecessary to Switch Modes



58. Once connected a host and device can disconnect electrically without having to physically disconnect plug and receptacle. The host can disconnect by turning off VBUS and tri-stating its data lines. The device can disconnect by turning off its speed resistor.

Welch (EX1013), ¶58

85. An Android product with a micro-USB connector can affect a dynamic mode switch by electrically detaching from the USB (¶58) and then changing the ID pin to the required state (floating for an attached host, ground for device) and reasserting the appropriate pull-up or pull-down resistors. If attached device is

Welch (EX1013), ¶85

Dr. Houh's Admission re Electrical Disconnection



14 Q. And in that case that you just mentioned when
15 you have, using software, disconnected the USB device,
16 could the USB device still physically be plugged into
17 the computer?

18 MR. BLUMENKOPF: Objection, form.

19 A. It may still be plugged in, yes, in my personal
20 experience.

EX1084 (Houh Tr.), 203:14-20)

Dr. Houh's Admission re Electrical Disconnection



1 Q. Having read section 4.6.2 of the USB 2.0
2 specification, do you have an understanding as to
3 whether the removal of a USB device requires physically
4 unplugging it from a port?

5 MR. BLUMENKOPF: Objection, form.

6 A. So this one paragraph I don't see any statement
7 about physical detachment, and I will point out that I
8 did search for "removal" to see if anywhere else it did.
9 The word "removal" appears only three times in this -
10 document if the search index is correct, the three times
11 that I found in my search. I didn't see those other
12 places addressed a physical issue.

EX1085 (Houh Tr.), 296:1-12

Mr. Welch Explains USB Reset Per the USB Standards



B. Reset/Initialization/Default State in USB Systems

8. The USB 2.0 specification defines “Power On Reset (POR)” as “Restoring a storage device, register, or memory to a predetermined state when power is applied.” EX1018, 36.

9. In Figure 9-1 from the USB 2.0 specification, Reset and Default are considered from the Device perspective. Here Reset is the signal sometimes referred to in the USB Specification as “Single Ended Zero” (SE0), which can be driven by the host to tell the device to switch to its “Default” state. *See* EX1018, §7.1.7.5 (“A hub signals reset to a downstream port by driving an extended SE0 at the port. After the reset is removed, the device will be in the Default state (refer to Section 9.1). ...

Welch Reply (EX1102), ¶¶8-9

Mr. Welch Explains USB Reset Per the USB Standards



Id., 268 (Fig. 9-1, annotated). The concept of a reset/initialization/default setting in

USB is not limited to just devices, but applies equally to USB hosts and USB hubs.

See id., Appendix C (providing “Reset Protocol State Diagrams”), §C.1

(“Downstream Facing Port State Diagram”), §C.2 (“Upstream Facing Port State

Diagram”), and §C.2.4 (describing the “Reset Handshake” protocol).

Welch Reply (EX1102), ¶9

Resetting the Mux/Crossbar Solves the Alleged “Dead End” Problem

- Applying the **basic concept of reset to Chang’s mux/crossbar** resolves the purported “dead-end” problem

7.1.7.3; Welch Reply, ¶¶9-10, 16. Using this existing “reset” information, the mux would revert to its initial/reset/default state to route incoming signals to the bridge’s detection unit for host/device determination.⁵ *Id.*, ¶¶48, 52-55.

This could be easily accomplished by, *e.g.*, the upstream host sending a signal that would be logically “ORed” (*e.g.*, using the well-known OR gate) to reset the mux select line(s) to route to the bridge. Welch Reply, ¶54 (discussing additional alternatives). Again, PO’s product documentation confirms a default

-011 Reply (Paper 30), 13-14

Resetting the Mux/Crossbar Solves the Alleged “Dead End” Problem

- Applying the **basic concept of reset to Chang’s mux/crossbar** resolves the purported “dead-end” problem

Using this existing information, the crossbar would revert to an initial/reset/default state to route incoming signals to the bridge’s detection unit for host/device determination.⁵ *Id.*, ¶¶48, 52-55. But any reset signal from the upstream host would respect an existing host-to-host connection. *Id.*, ¶55. This is not problematic because a single-bridge system only supports one host-to-host connection at a time. *Id.*; EX1003, 7:4-6. This could be easily accomplished using, *e.g.*, basic logic (such as an “if” condition) that was well-known to POSITAs. Welch Reply, ¶55. In such a circumstance, any other downstream USB products would connect as USB devices since the only bridge/host connection is already taken. *Id.*

-288 Reply (Paper 30), 14

Mr. Welch Explains USB Reset Per the USB Standards



52. Accordingly, when a connection is closed, the headend will know about it and can use this information (*e.g.*, the SE0 signaling which acts as a “reset”) to notify the mux/crossbar to revert to a default state in which it routes the incoming USB signal to the bridge where the detection unit can then process it. Depending on the detected mode of the downstream USB product, the detection unit can maintain the existing routing to the bridge (*i.e.*, of a downstream host is detected) or toggle the mux/crossbar select line(s) to establish a host-to-device connection if a downstream device is detected. In this way, the proposed combinations avoid the “dead-end” condition hypothesized by Patent Owner.

53. The means to do this are straightforward and easy to implement for a POSITA, for both the Mux and Crossbar Implementations. The necessary information is already available in any hub that complies with the USB standards.

Welch Reply (EX1102), ¶¶52-53

Mr. Welch Explains Resetting the Mux



54. For the Mux Implementations, all that is required is sending a signal from the upstream host that will toggle the mux to its initial/default state (*i.e.*, routing signals to the bridge) when the upstream host knows that a data connection has been closed (*viz.*, in response to SE0). The well-known “OR” gate (or even a wired OR function that adds no addition gates) could be used to allow the head end signal to reset the mux select line(s) without disrupting normal operation of the detection unit.

Welch Reply (EX1102), ¶54

Mr. Welch Explains USB Resetting the Crossbar



55. Only one slight difference applies to the Crossbar Implementations, which is that any reset signaling would respect (*i.e.*, not disconnect) an existing host-to-host connection. This could be easily accomplished using basic logic such as the extremely well-known “if” condition, which is trivial to implement in either hardware or software (which one to use is merely a design choice). Nor is implementing this condition otherwise problematic from a system perspective. To the contrary, it is helpful because a system with only one bridge (which is the case in my proposed combinations) can only support one host-to-host connection at a time.⁵ This way, persistence is maintained for an existing host-to-host connection

Welch Reply (EX1102), ¶55

Aptiv's *Medtronic* Case is Distinguishable

- Aptiv cites *Medtronic* for proposition that “extensive” modifications indicate hindsight (Sur-reply, 14)
- But that case is legally and factually distinguishable:
 - In contrast to Microchip, Medtronic was trying to fix its original combination
 - Unlike Microchip’s use of existing reset signals, Medtronic’s fix required “extensive” changes

dicative of hindsight. It was within the Board’s discretion not to consider these untimely raised modifications. See *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (“Once the Board identi-

tion of fact,” reviewed for substantial evidence). The Board observed that replacing Kontos’ funnel with a side opening would “require[] significant modifications to Kontos’ device, modifications that were not proposed in the Petition.”

Medtronic, Inc. v. Teleflex Innovations S.A.R.L.,
70 F.4th 1331, 1347 (Fed. Cir. 2023).

Aptiv's Motion to Strike (and Related Sur-Reply Argument)

The Board Should Deny Aptiv's Motion to Strike

- Aptiv moves to strike to strike Petitioner's rebuttal to the "dead end" argument (*viz.*, Reply §IV.A.3.b; Welch Reply (EX1102), ¶¶6-17, 44-57; and EX1003 (textbook excerpts))
- The motion is moot if the Board agrees with either of Petitioner's principal unpatentability arguments (-228 Opposition (Paper 36), 1)
- The Board should deny the motion for three reasons:
 - Petitioner's Reply directly and fairly responds to the POR (*id.*, 6-9)
 - Petitioner could not reasonably have anticipated Aptiv's dead end argument (*id.*, 9-10)
 - Aptiv suffers no prejudice (*id.*, 10)

Aptiv Misconstrued the Combination

²Notwithstanding that Mr. Welch's original declaration expressly stated the combination's "detection unit must connect to the downstream port to detect the mode, as shown in Chang II" (Welch, ¶193), PO misconstrued the combination as requiring the detection unit to receive and process signals from the mux/crossbar (instead of the downstream port) to concoct a purported "dead-end" state. *See supra* §II.B. Petitioner's Reply at §IV.A.3.a explained why this interpretation was wrong, and Reply §IV.A.3.b elaborated on why the combination worked under PO's presentation of it. *Rembrandt*, 76 F.4th at 1385 (reply proper that "elaborates on the

-228 Opposition (Paper 36), 7

Motion to Strike: Legal Standard

III. LEGAL STANDARD

A reply may “respond to arguments raised in the corresponding opposition.” 37 C.F.R. §42.23(b). The 2019 Consolidated Trial Practice Guide (“CTPG”) recognizes it may be appropriate for a “party [to] submit rebuttal evidence in support of its reply,” including a “new expert declaration.” CTPG, 73. “Since the need to rely on new evidence in response may not arise until a particular point has been raised in the [POR or ID], we have held that there is no blanket prohibition against the introduction of new evidence during an IPR.” *Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1384 (Fed. Cir. 2023).

Motion to Strike: Legal Standard

Indeed, “the introduction of new evidence in the course of the trial is to be expected in [IPR] trial proceedings” and permissible “as long as the opposing party is given notice of the evidence and an opportunity to respond to it.” *Rembrandt*, 76 F.4th at 1384 (quoting *Genzyme Therapeutic Prods. Ltd. P’ship v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1366 (Fed. Cir. 2016)). Thus, “a reply may be proper if it is responsive and simply expands on previously raised arguments.” *Id.*

-228 Opposition (Paper 36), 5

Motion to Strike: Legal Standard

“[U]nder the Board’s rules and consistent with the Supreme Court’s decision in *SAS*, a petitioner is entitled to respond to new arguments made in a [POR]... ‘As we have regularly held, the petitioner [] may introduce new evidence after the petition stage if [it] is a legitimate reply to evidence introduced by the [PO].’”

Axonics, Inc. v. Medtronic, Inc., 75 F.4th 1374, 1380 (Fed. Cir. 2023) (citing *Apple Inc. v. Andrea Elecs. Corp.*, 949 F.3d 697, 706-707 (Fed. Cir. 2020).

-228 Opposition (Paper 36), 5

Petitioner Could Not Reasonably Anticipate PO's Argument

²Notwithstanding that Mr. Welch's original declaration expressly stated the combination's "detection unit must connect to the downstream port to detect the mode, as shown in Chang II" (Welch, ¶193), PO misconstrued the combination as requiring the detection unit to receive and process signals from the mux/crossbar (instead of the downstream port) to concoct a purported "dead-end" state. *See supra* §II.B. Petitioner's Reply at §IV.A.3.a explained why this interpretation was wrong, and Reply §IV.A.3.b elaborated on why the combination worked under PO's presentation of it. *Rembrandt*, 76 F.4th at 1385 (reply proper that "elaborates on the

-228 Opposition (Paper 36), 7

Petitioner Could Not Reasonably Anticipate PO's Argument

A. Petitioner's Reply Directly and Fairly Responds to the POR

To begin, Petitioner's Reply raises no new grounds, prior art references, or combinations (EX1103 is a textbook excerpt cited for the mundane proposition that many electronic devices can be reset). Petitioner's Reply maintains the same ground (*viz.*, Chang in view of Chang II and a POSITA's knowledge) from the Petition, including that one location for the detection unit is in the bridge. *E.g.*, Reply,

-228 Opposition (Paper 36), 6

Aptiv's *Microsoft* Case is Distinguishable

- Aptiv cites *Microsoft v. Biscotti* for excluding Microchip's "reset" argument (Sur-reply, 2)
- But that case is factually distinguishable:
 - On ***appeal***, Microsoft raised "far more detailed" and "substantial new arguments"
 - Microchip properly raised the reset argument in reply in response to Aptiv's POR which misframed the Petition

Microsoft's brief on appeal is far more detailed and contains substantial new arguments regarding why it believes Kenoyer anticipates this limitation of claim 69.

37 C.F.R. § 42.104(b)(5) (emphasis added). And, the general rule is that any argument not raised before the Board is waived on appeal. See *Redline Detection, LLC v. Star Envirotech, Inc.*, 811 F.3d 435, 450 (Fed. Cir. 2015). Microsoft not only failed to present these arguments in its petition, it never sought permission to present them to the Board during the course of the IPR.

Microsoft Corp. v. Biscotti, Inc., 878 F.3d 1052, 1074-75 (Fed. Cir. 2017)

Vimeo Does Not Support Aptiv

- Citing *Vimeo*, Aptiv argues the Board should disregard Petitioner's signal detector arguments (Sur-reply, 4)
- But *Vimeo* is factually distinguishable and supports Petitioner
 - Petitioner pincites Mr. Welch's testimony which DOES support and clarify the Petition

In any event, Dr. Reader's declaration does not adequately support or clarify the Petition's argument. Initially, Dr. Reader discusses the probe-

We next consider Dr. Reader's testimony in greater detail. Dr. Reader provides additional detail missing from the Petition, but his declaration cannot make up for the Petition's brevity when Petitioners cite indiscriminately to four pages of his declaration in support of a single proposition. See Pet. 53 (citing Ex. 1008 § VII.A.1). It is the Petition, not

Vimeo, Inc. v. British Telecommunications PLC,
IPR2019-00833, Paper 20, 48 (PTAB Aug. 5, 2020)

Vimeo Does Not Support Aptiv

- *Vimeo* was decided on numerous other facts not present here

Second, Dr. Reader's assertion that the transmission rate "may continue to increase" after a coding rate switch is insufficient to show that a skilled artisan would have understood the transmission rate *would* increase.

Finally, Dr. Reader's testimony is unpersuasive because it relies on Lippman's pre-roll period to establish transmission rate timing, but Petitioners propose *eliminating* Lippman's pre-roll period in the combination with Chou. *Compare* Ex. 1008 ¶ 158 ("[A] skilled worker

Vimeo, Inc. v. British Telecommunications PLC,
IPR2019-00833, Paper 20, 49 (PTAB Aug. 5, 2020)

The *Cisco* Case is Inapposite

- Citing *Cisco*, Aptiv argues the Board should disregard Petitioner's signal detection arguments (Sur-reply, 4)
- But *Cisco* is distinguishable
 - Cisco asserted 20 prior art grounds and primarily concerned improper incorporation by reference and bulk cites
 - Microchip's Petition has an entire MTC section and a host/device detection section with pincites Pet., §§ VII.A.1, III.B.1
 - Chang II also discloses host/device signal detection

play archeologist with the record.”). In the Petition before us, incorporation by reference of numerous arguments from Dr. Roy's 250-page Declaration into the Petition serves to circumvent the page limits imposed on petitions for *inter partes* review, while imposing on our time by asking us to sift through over 250 pages of Dr. Roy's Declaration (including numerous pages of claim charts) to locate the specific arguments corresponding to the numerous paragraphs cited to support Petitioner's assertions.

Cisco Sys., Inc. v. C-Cation Techs., LLC,
IPR2014-00454, Paper 12, 10 (PTAB Aug. 29, 2014)

Id. at 47–48 (footnotes omitted). For exemplary claim 19, the Petition does not provide sufficient articulated reasoning with rational underpinning explaining which elements of Thompson would be combined with those of Cioffi, and why one with ordinary skill in the art would modify the teachings of Thompson in view of Cioffi's teachings to arrive at the claimed invention.

Id., 14

Liberty Mutual Does Not Support Aptiv

- Citing *Liberty*, Aptiv asserts Petitioner's Reply is entitled to "no weight" (Sur-reply, 2, 4, 19)
- But *Liberty* is procedurally and factually distinguishable
 - 422 grounds vs 1 (or 2) grounds
 - Pre-institution Order (silent re Reply briefs)
 - No expert testimony vs ample Welch testimony
 - No rationale for adding three additional references vs reasoned explanation

('358 patent) was filed on September 16, 2012. Petitioner has asserted four hundred and twenty two (422) grounds of unpatentability against the 20 claims of the '358 patent, averaging more than 21 grounds per claim. The Patent Owner has

Liberty Mutual Ins. Co. v. Progressive Casualty Ins. Co.,
CBM2012-00003, Paper 8, 1 (PTAB Oct. 25, 2012)

vehicle. The declaration of Andrews, in the cited paragraphs 23 and 24, contains no testimony to the effect that the speed of data transmission from Kosaka's

Id., 12

alleged as obvious over prior art, and the prior art. Here, Petitioner has not clearly identified the differences between claim 1 and Kosaka, and the Petitioner's reasoning on adding Scapinakis, Eisenmann, or Stanifer to the basic combination of Kosaka or Kosaka and Bouchard is vague and ambiguous at best.

Id., 15

The *Arista* Case is Inapposite

- Citing *Arista*, Aptiv asserts Petitioner's Reply is entitled to "no weight" (Sur-reply, 2)
- But *Arista* is distinguishable
 - Microchip's reply is "responsive" to Aptiv's red herring inoperability argument
 - Microchip maps the prior art to every claim element (only the '643 claims recite a "signal detection circuit")

publications relied upon"). Page 27 describes Sandick's configuration of a router using the CLI, but does not identify the CLI as the recited "router configuration subsystem," and does not explain what role if any Sandick's teaching of configuration via CLI plays in the combination with AgentX's MIB. Pet. 27. The explanations in the Reply, therefore, are not responsive to Patent Owner's arguments that the limitation is not disclosed. Rather they

Arista Networks, Inc. v. Cisco Systems, Inc.,
IPR2016-00308, Paper 42, 14 (PTAB May 25, 2017)

subsystem." For example, page 15 of the Petition provides a general summary of Sandick, and does not tie any of the disclosures to claim limitations as required by 37 C.F.R. §42.104(b)(4) ("petition must specify

Id., 13-14

Petitioner Could Not Reasonably Anticipate PO's Argument

B. Petitioner Could Not Reasonably Anticipate PO's Argument

PO asserts “Petitioner should have been aware of the dead-end problem before filing the Petition” and included it in the Petition. Mot., 8-9. But for the reasons explained in §II.A-B, Petitioner could not have reasonably anticipated PO's manufactured “dead-end” argument which misconstrues Petitioner's proposed combination in ways that would create written description and enablement problems for the Challenged Patent (*viz.*, PO creates a double standard by requiring the prior art combination to solve purported problems that would exist in the Challenged Patent which does not disclose—let alone explain—the role and operation of a signal detection circuit).

-228 Opposition (Paper 36), 9

Aptiv Suffers No Prejudice

C. PO Suffers No Prejudice

PO contends it is deprived of a “fair opportunity to respond” to Petitioner’s Reply. Mot., 9. Not so. PO already noticed Mr. Welch’s deposition (Paper 33), Petitioner agreed to extend PO’s sur-reply deadline (Paper 34), and PO gets the last word as part of its 5,600 word sur-reply. PO’s complaint that it is “without the benefit of additional evidence, including direct expert testimony” rings especially hollow when it did not even request alternative relief of a sur-reply declaration. *See Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1384 (Fed. Cir. 2023) (noting

-228 Opposition (Paper 36), 10

MotivePower Does Not Help Aptiv

- Aptiv’s reliance on *MotivePower* for its “design choice” argument (Sur-reply, 17, citing *MotivePower Inc. v. Cutsforth, Inc.*, IPR2013-00274, Paper 44, 50 (PTAB Sept. 9, 2016)) is misplaced for several reasons:
 - Aptiv’s **own expert** admits “a POSITA would understand that the location of the signal detection circuit was a matter of design choice” and provides reasons for placing it in certain locations EX2001 (Houh), ¶116; *see also* EX1072, 597 (Aptiv admitting the same thing)
 - Petitioner provides ample explanation and evidence for the operation and location of host/device signal detection circuitry. EX1013 (Welch), ¶¶74-87, 192-193; EX1102 (Welch Reply), ¶¶32-57
 - Unlike *MotivePower* (pg. 45), the disputed functionality here (USB reset) is **NOT a claim limitation** or a motivation to combine, and **any way of sending reset suffices**. EX1102, ¶¶54-55
 - Petitioner provides ample explanation and evidence of USB reset use and operation. EX1102 (Welch Reply), ¶¶8-10, 44-57

Rebuttal to Aptiv's “Particularity” Argument

Aptiv's "Particularity" Argument

PO argues the Petition relies on “[c]onclusory [s]tatements” and “[u]nspecific [e]xpert [t]estimony” for *routing logic circuit*. POR, §VII.D (37-39).

PO makes a substantially similar argument in §VII.B.1, contending Petitioner’s mux explanation is too “limited and nonspecific” to support obviousness. *Id.*, 19-22. In other words, PO contends a POSITA could not perform host/device detection and route a mux accordingly. PO’s argument fails.

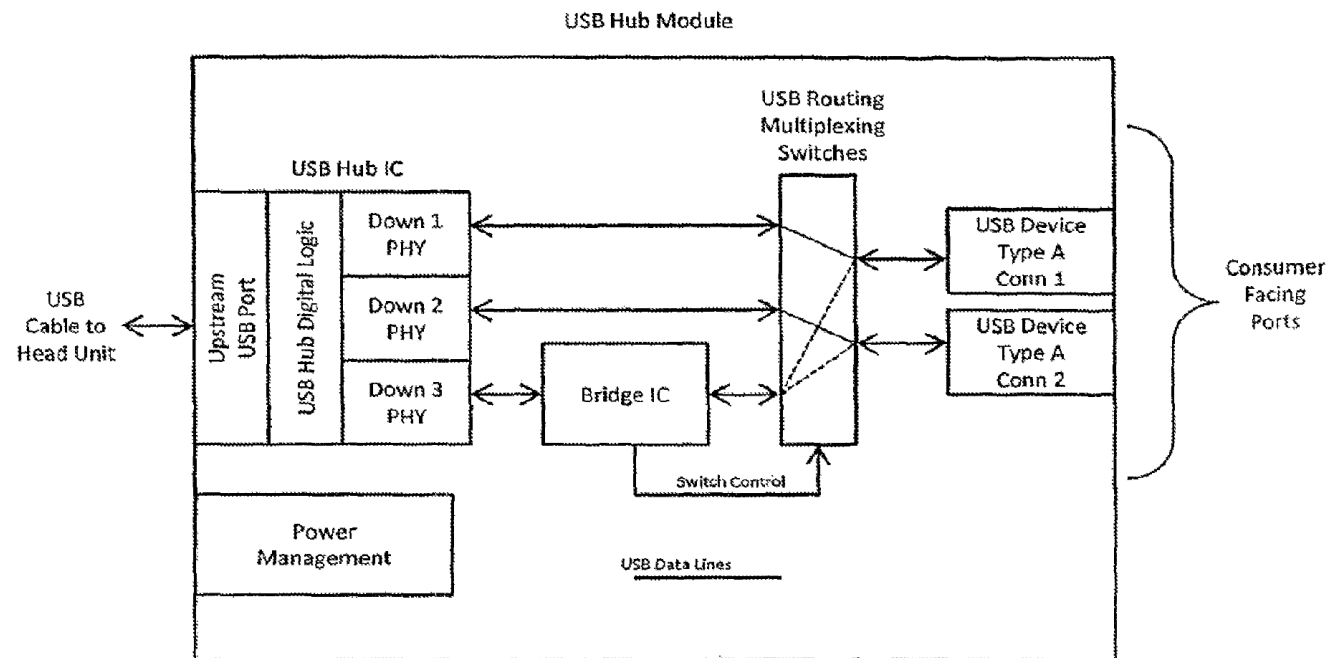
-011 Reply (Paper 30), 15

Aptiv's “Particularity” Argument Fails for Several Reasons

- Aptiv employs a **double standard** requiring more of the prior art than the Challenged Patents disclose
- **Mux/crossbar datasheets** themselves show how to configure the select line(s). *E.g.*, EX1060, 1, EX1068, 1-2 (showing routing and truth table)
- Dr. Houh admitted the “exact components used to enact the routing switch...**[are not] particularly material to the invention**” and “the use of various switches, logic gates, control lines, port identifiers, etc. is a **design choice left to the POSITA.**” EX2001, ¶103

Aptiv's Double Standard re Disclosure

- Petitioner provided more detail than the Challenged Patents about host/device detection and crossbar operation and routing.



'420 Patent, Fig. 4

Aptiv's Double Standard re Disclosure

USB routing switch might include the signal detection circuit. (Petition, 102.) But the specification need not disclose routine implementation details or exemplary implementations of the invention to satisfy written description. *See, e.g., Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 923 (Fed. Cir. 2004). Petitioner's argument also ignores that a POSITA reviewing the specification and claims may rely on his or her knowledge and skill in the art. *See Boston Sci. Corp. v. Johnson & Johnson*, 647 F.3d 1353, 1366 (Fed. Cir. 2011) ("Because the specification is

-011 POR (Paper 25), 87

Aptiv's Double Standard re Disclosure

an enabling disclosure. Nor did the Board indicate that appellant's specification lacks such an enabling disclosure. Rather, the Board's observation that appellant did not provide the type of detail in his specification that he now argues is necessary in prior art references supports the Board's finding that one skilled in the art would have known how to implement the features of the references and would have concluded that the reference disclosures would have been enabling.

In re Epstein, 32 F.3d 1559, 1568 (Fed. Cir. 1994)



Aptiv's Double Standard re Disclosure

A POSITA would understand, based on the specification's disclosure and his or her general understanding of routing switches and signal detection circuits in the field of USB, that the inventors had possession of the claimed subject matter.

-011 POR (Paper 25), 88

We also note that under the enablement standard that AST would have us apply to Yokoyama, the '456 patent itself would be non-enabling. The '456 patent similarly relies on the knowledge and skill of those skilled in the art. If detailed disclosure regarding implementation of known electronic and mechanical components necessary to build a computer were essential for an anticipating reference, then the disclosure in the '456 patent would also fail to satisfy the enablement requirement. See *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1569, 7 USPQ2d 1057, 1063 (Fed. Cir. 1988).

In re Paulsen, 30 F.3d 1475, 1481 n.9 (Fed. Cir. 1994)

Koninklijke Philips N.V. v. Google LLC Support Petitioner

- Aptiv cites *Google* to downplay the role of a POSITA's knowledge in the obviousness analysis (-228 POR (Paper 25), 50-51)
- But *Google* actually supports Petitioner's position

tion pertains.” 35 U.S.C. § 103. Regardless of the tribunal, the inquiry into whether any “differences” between the invention and the prior art would have rendered the invention obvious to a skilled artisan necessarily depends on such artisan's knowledge. *Dow Jones & Co. v. Abblaise Ltd.*,

Koninklijke Philips N.V. v. Google LLC, 948 F.3d 1330 at 1337 (Fed. Cir. 2020)

Koninklijke Philips N.V. v. Google LLC Support Petitioner

- Aptiv cites *Google* to downplay the role of a POSITA's knowledge in the obviousness analysis (-228 POR (Paper 25), 50-51)
- But *Google* actually supports Petitioner's position

First, Philips argues that because 35 U.S.C. § 311(b) expressly limits inter partes reviews to “prior art consisting of patents or printed publications,” and because general knowledge is neither of those, § 311(b) prohibits use of general knowledge to supply a missing claim limitation in an inter partes review. **We disagree.**

Koninklijke Philips N.V. v. Google LLC, 948 F.3d 1330 at 1337 (Fed. Cir. 2020)

Koninklijke Philips N.V. v. Google LLC Support Petitioner

- Aptiv cites *Google* to downplay the role of a POSITA's knowledge in the obviousness analysis (-228 POR (Paper 25), 50-51)
- But *Google* actually supports Petitioner's position

Although the prior art that can be considered in inter partes reviews is limited to patents and printed publications, it does not follow that we ignore the skilled artisan's knowledge when determining whether it would have been obvious to modify the prior art. Indeed, under 35 U.S.C.

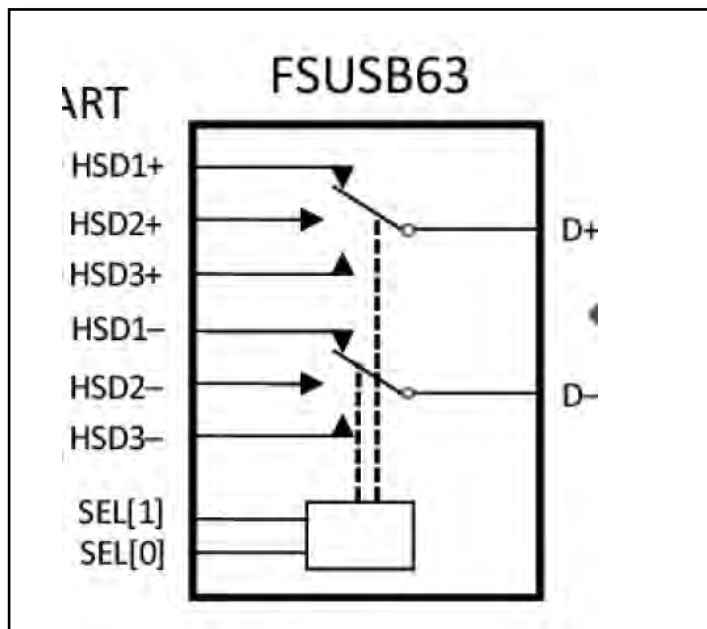
Koninklijke Philips N.V. v. Google LLC, 948 F.3d 1330 at 1337 (Fed. Cir. 2020)

Mux/Crossbar Routing is Well Within a POSITA's Knowledge and Skill

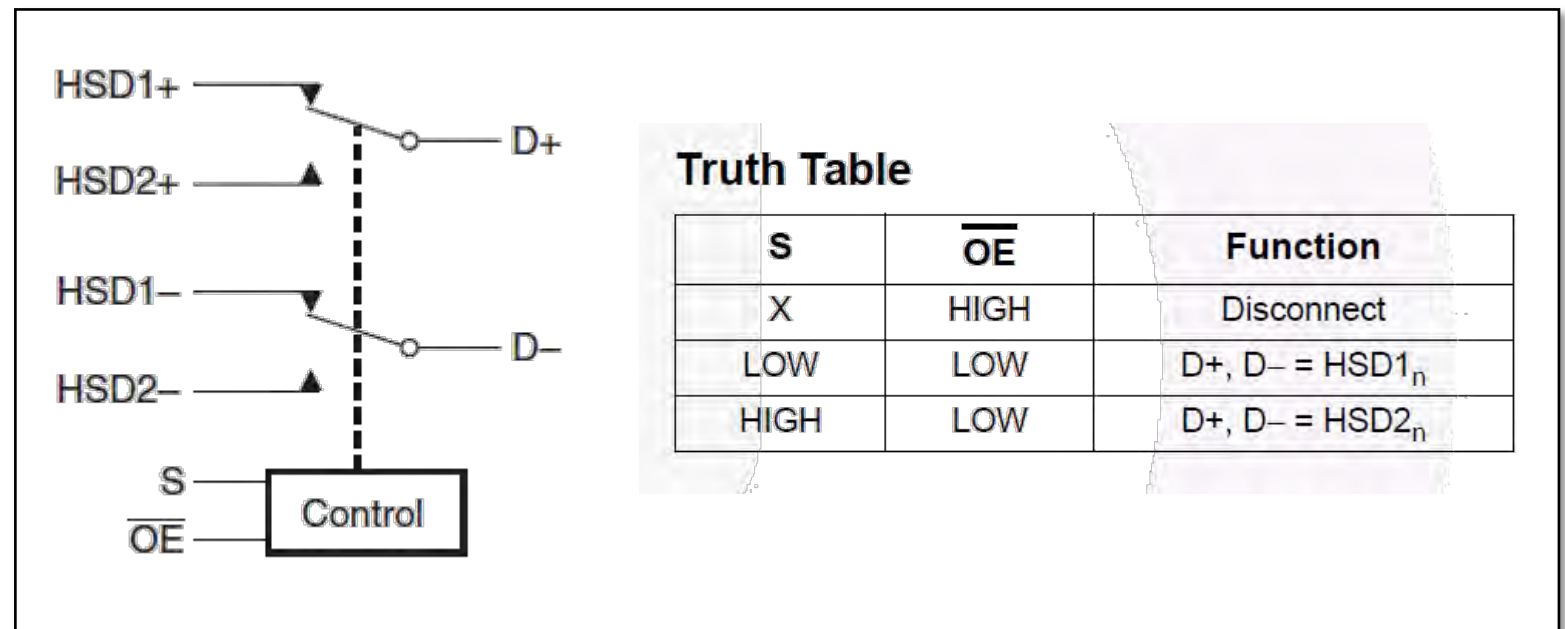
Chang II” to route a USB signal. POR, 22. But crossbar operation is straightforward and well within a POSITA’s knowledge and skillset. Welch, §VI.B.2. There is nothing magical about using such components to route USB signals, especially considering the numerous commercial parts available for that very purpose. *Id.*; EX1059. An engineer that could not perform this straightforward task (*e.g.*, assigning select lines “0” or “1” for a given scenario) would soon be unemployed.

-228 Reply (Paper 30), 16-17

Datasheets Show How to Control Mux/Crossbar Routing



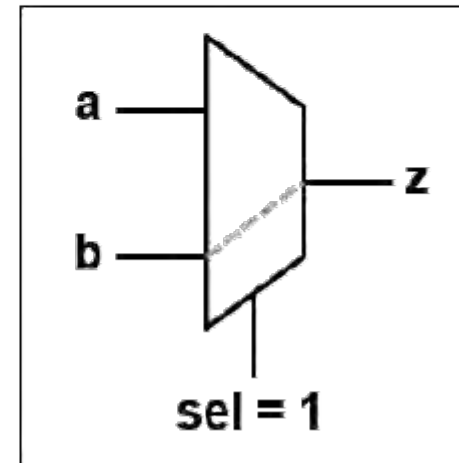
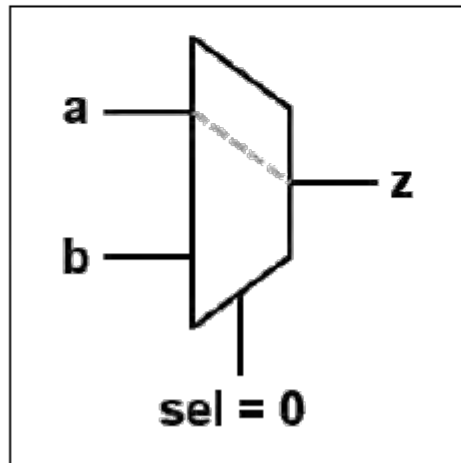
EX1060 (Mux Datasheet), 1



EX1068 (Mux Datasheet), 2

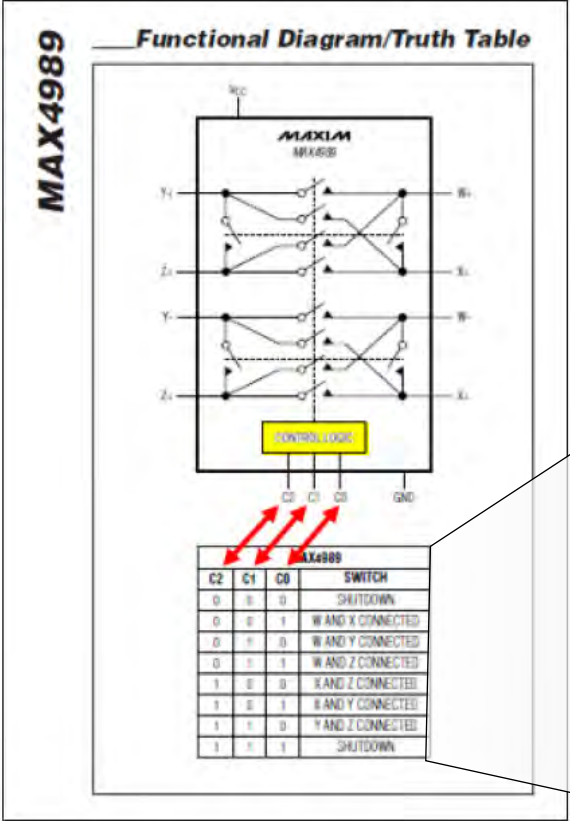
Datasheets Show How to Control Mux/Crossbar Routing

¶88. For example, the well-known 2:1 multiplexing switch, shown below, enables connecting either signal “a” or “b” to signal “z” via the “sel” (select) control signal. *Id.*, ¶89.



-228 Petition (Paper 1), 10

Datasheets Show How to Control Mux/Crossbar Routing



MAX4989			
C2	C1	C0	SWITCH
0	0	0	SHUTDOWN
0	0	1	W AND X CONNECTED
0	1	0	W AND Y CONNECTED
0	1	1	W AND Z CONNECTED
1	0	0	X AND Z CONNECTED
1	0	1	X AND Y CONNECTED
1	1	0	Y AND Z CONNECTED
1	1	1	SHUTDOWN

EX1063, 8 (annotated); see also id., 7 (“The MAX4989 provides three control logic inputs, C0, C1, and C2, to control the switch connections”).

EX1063 (MAX4989 Datasheet), 8

Dr. Houh's Admissions



120. Moreover, in the art of electrical engineering, circuits can be combined with predictable results. For example, because circuits behave predictably when combined, a POSITA could select a desired circuit from the class of signal detection circuits and expect it to work with a given routing switch. Conversely, a variety of routing switches could be used to route the signals in accordance with a determination by a signal detection circuit.

-228 EX2001 (Houh), ¶120

Dr. Houh's Admissions

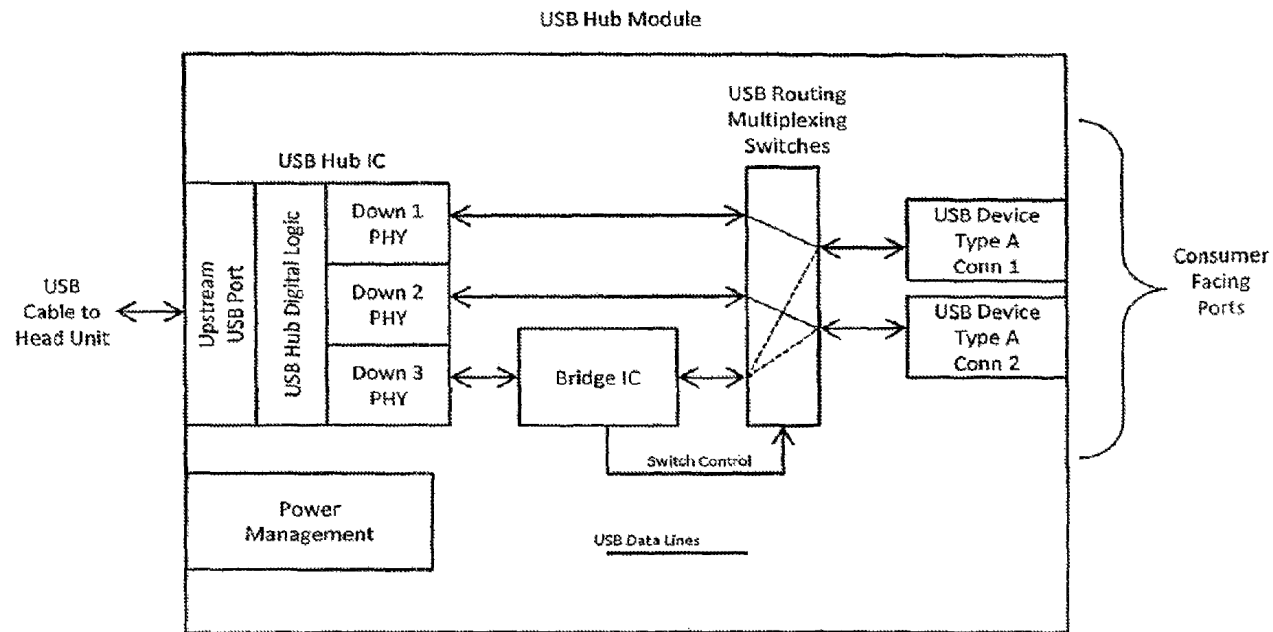


4:40-43, Figs. 4-6.) The exact components used to enact the routing switch would necessarily vary based on the implementation, nor are they particularly material to the invention so long as the routing operation is achieved. Thus, the use of various switches, logic gates, control lines, port identifiers, etc. is a design choice left to the POSITA. But in view of the specification's examples, a POSITA could

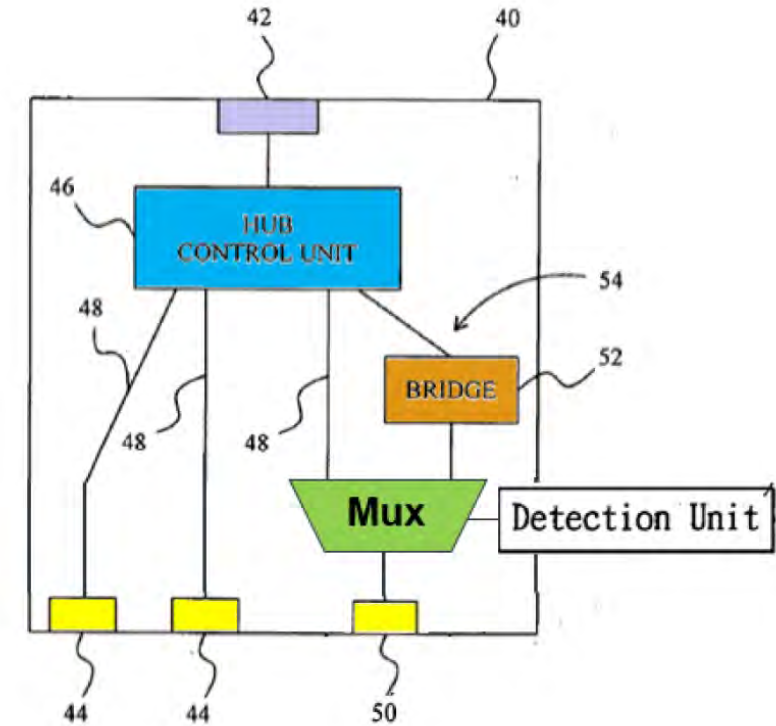
-228 EX2001 (Houh), ¶103

-495 EX1105 (Houh), ¶103 (same)

Aptiv's Double Standard re Disclosure



'420 Patent, Fig. 4



-011 Pet. (Paper 1), 49

Secondary Considerations

Secondary Considerations

- Aptiv does **NOT** assert:
 - Licensing (commercial acquiescence)
 - Unexpected results
- Even if the factors Aptiv argues had any merit, they fail to counter-balance **Petitioner's strong showing of obviousness**
- Aptiv **fails to establish nexus** for procedural and substantive reasons
- Aptiv's remaining arguments fail individually on the merits

Patent Owner has Never Licensed the Challenged Patents

- Aptiv showed no commercial acquiescence from any entity either seeking or taking a license to any Challenged Patent
- Dr. Houh confirmed this at deposition



14 Q. Are you aware of anyone taking a license to the
15 Aptiv patents?
16 MR. BLUMENKOPF: Objection, form.
17 A. I'm not aware one way or the other.

EX1085 (Houh Tr.), 302:14-22

Patent Owner has Shown No Unexpected Results

- Aptiv showed no unexpected results, as confirmed by Dr. Houh



14 Q. Did you provide an analysis in your declaration
15 concerning unexpected results created by the claimed
16 invention?

17 MR. BLUMENKOPF: Objection, form.

18 A. I don't think so, no, in the '643 declaration.

EX1085 (Houh Tr.), 303:14-304:13

Patent Owner has Shown No Unexpected Results

- Aptiv showed no unexpected results, as confirmed by Dr. Houh



2 Q. Do you render any opinions in any of your
3 declarations on the secondary considerations of licenses
4 showing industry respect for the invention, commercial
5 success, unexpected results created by the claimed
6 invention, or unexpected properties of the claimed
7 invention?

8 MR. BLUMENKOPF: Objection, form.

9 A. Just flipping through my other four —
10 declarations, I don't see any subheadings in this
11 section, the same section in the other ones, that are
12 directed to those issues you asked about in your —
13 question.

EX1085 (Houh Tr.), 303:14-304:13

Patent Owner has Shown No Unexpected Results

- The USB hub, bridge, routing switch, etc. perform exactly as expected



318. *Unexpected Results / Skepticism.* I am not aware of any unexpected results. The components (*e.g.*, USB hub, USB bridge, and USB multiplexers) were readily available off-the-shelf components that were simply used for their intended purposes when combined to create claimed subject matter. There is nothing unexpected about how these components work in combination—they simply perform their normal functions to achieve an expected result. Nor would a POSITA have been skeptical of this.

EX1013 (Welch), ¶318

- Patent Owner presented no contrary evidence

Leo Pharm. Does Not Support Aptiv

- Aptiv cites *Leo Pharm.* for using secondary considerations to avoid the “trap of hindsight” (Sur-reply, 28)
- But that case is factually distinguishable:

marks omitted). This record shows “extensive experimental evidence” of unexpected results that contradict the Board’s obviousness finding. J.A. 14. The Board conclud-

corticosteroid component. See J.A. 1045–46. These test results are a strong indication that the ’013 patent’s combination of known elements yields more than just predictable results.

The record also shows evidence of *long* felt but unsolved need, *i.e.*, the need for a single formulation to treat psoriasis. The length of the intervening time between the

Leo Pharm. Prods., Ltd. v. Rea, 726 F.3d 1346, 1358 (Fed. Cir. 2013)

Patent Owner Fails to Rebut the Strong Showing of Obviousness

- Even if Aptiv's allegations had merit, they would not overcome Petitioner's strong obviousness showing



Moreover, secondary considerations of nonobviousness—considered here by the district court—simply cannot overcome a strong prima facie case of obviousness.

See Asyst Techs., Inc. v. Emtrak, Inc., 544 F.3d 1310, 1316 (Fed. Cir. 2008); *Agrizap, Inc. v. Woodstream Corp.*, 520 F.3d 1337, 1344 (Fed. Cir. 2008); *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (holding that the objective considerations of nonobviousness presented, including substantial evidence of commercial success, praise, and long-felt need, were inadequate to overcome a strong showing of primary considerations that rendered the claims at issue invalid); *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1371 (Fed. Cir. 2006) (“The

Wyers v. Master Lock Co., 616 F.3d 1231, 1246 (Fed. Cir. 2010)

Patent Owner Fails to Rebut the Strong Showing of Obviousness

- Dr. Houh had no opinion that the alleged secondary considerations overcame a strong obviousness case

11 Did you render an alternative opinion that
12 even if there were a strong prima facie case of
13 obviousness, that it would be overcome by the secondary
14 considerations?

15 MR. BLUMENKOPF: Objection, form.

16 A. I mean, I don't think I address that because I
17 don't believe -- you know, my opinions in this case are
18 that there's -- the combinations are not obvious for the
19 reasons I've laid out here, including using hindsight
20 analysis. So I don't believe there is a case -- I don't
21 believe the petition has made a prima facie case of
22 obviousness for the reasons I've outlined here.

EX1084 (Houh Tr.), 55:11-22

Aptiv's Secondary Considerations Fail

Aptiv's Secondary Considerations Fails on the Merits

- Aptiv **fails to establish nexus** on the merits
- Aptiv's **long-felt need/skepticism/failure/copying** story fails
- Aptiv's **industry praise** (PACE award) argument fails
- Aptiv's **commercial success** argument fails

Aptiv Tries to Show Nexus Through Three Requirements

Aptiv won this business because its innovative solution permitted it to satisfy the three automaker requirements: (1) single upstream connection, (2) CarPlay on all ports, and (3) persistent downstream connectivity on non-CarPlay ports. (EX2033, EX2042, 201:19-202:22.) Aptiv's pitch to automakers for the

-228 POR (Paper 25), 74

Aptiv's "Single Lane" Argument Fails

- Only claims in other patents not at issue here (e.g., '037 patent claim 14) have a "single lane" requirement

14. A system as recited in claim 1, wherein the system further comprises an infotainment system with the embedded USB Host which is electrically connected to the USB Hub via a single USB data connection.

'037 patent (EX1001), cl. 14

- Some automakers, like Honda, did **NOT** want a single lane limitation (EX2006, 2)

Aptiv's “CarPlay on All Ports” and “Persistence” Arguments Fail

- No Challenged Claims recite (let alone require) “CarPlay on all ports”
- The CarPlay specification is not even in the record (or even mentioned in the Challenged Patents)
- Most claims do not require “persistent” downstream connectivity on non-CarPlay ports
- No '072 or '643 patent claims even require multiple downstream ports, making the concept of “persistence” irrelevant

Aptiv's Case Law is Unavailing

- Aptiv's cites *In re DBC* for proposition that unclaimed features "permit[ted]" by a claim establish nexus. Sur-reply (Paper 40), 29
- The case stands for a different proposition and supports Petitioner

a vegetable juice. Apparently, the Board thought that the commercial embodiment of the claim must contain both a fruit juice and a vegetable juice since the claim recites "at least one second juice selected from the group consisting of fruit juice and vegetable juice." On this point, the Board also erred. DBC need not sell every conceivable

In re DBC, 545 F.3d 1373, 1384 (Fed. Cir. 2008)

Aptiv's Long-felt Need Arguments Actually Supports Petitioner

Long-felt need. PO's long-felt need assertions are self-defeating. POR, 67-69. First, PO admits CarPlay was not announced until 2013 (POR, 67), mere months before the '962 patent's earliest priority date (EX1005, 2). That is the opposite of "long-felt" need. PO attempts to move the date back to 2010 by

-228 Reply (Paper 30), 25

There was No “Long-Felt” Need



41. Around 2013, Apple informed automakers of its plans to release a new technology known as CarPlay which was designed to create a seamless user experience in compatible vehicles. (EX2003, 49:17-53:9.) Specifically, when an iPhone connected to a vehicle’s infotainment system, the iPhone applications would be displayed on the infotainment system’s screen. Apple provided automakers with the technical requirements to make their vehicles compatible, described in an Accessory Interface Specification. To ensure the requirements were met, Apple implemented a certification process wherein only approved systems would be allowed to implement CarPlay. (EX2017, 199:21-200:8.)

EX2019 (Houh Supp. Dec.), ¶41

Skepticism/Failure of Others/Copying Story Fails

- Aptiv’s “[f]ailure of others/skepticism of skilled artisans” argument (-228 POR (Paper 25), 67-72, 76-80) fails for two primary reasons (Reply (Paper 30), 27-29):
 - Any skepticism, etc. was based on **receiving different information** about the acceptability of a bridge to support CarPlay from Apple
 - The emails Aptiv relies on are primarily from marketing and sales personnel

Apple's Messaging to Aptiv: It's "Fine" to Use a Bridge



The answer we got was yeah, this looks fine, but please understand that, you know, Apple's policy is we write requirements.

EX2003 (Trial. Tr.), 114:23-115:2 (Mr. Voto)



From: Don Perkins - C21824
Sent: Sunday, September 8, 2013 1:40 PM MST
To: Jesse Lyles - C21757; Chris McGrath - C21774; Brigham Steele - C21902; C21577; Jesse Lyles - C21757
CC: Henry Muyshondt - C21801; Stefan Saenger - M21164; Johann Stelzer -
Subject: Apple Meeting Overview and "Flex Connect" Update
Attachments: Flexconnect Primer R5 w 4604.ppt



CONFIDENTIAL

Aptiv Substitutes Marketing / Sales Personnel for a POSITA



The POSA is patent law's hypothetical, legal construct “akin to the ‘reasonable person’ used as a reference in negligence determinations.” *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). This theoretical person is the objective vantage point for making obviousness determinations according to the statute, see 35 U.S.C. § 103,¹ and Supreme Court and Federal Circuit case law, see *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966); see *Custom Accessories, Inc. v. Jeffrey-Allan Indus.*, 807 F.2d 955, 962 (Fed. Cir. 1986).

McCoy v. Heal Sys., LLC, 850 F. App'x 785, 788 (Fed. Cir. 2021)

Aptiv Substitutes Marketing / Sales Personnel for a POSITA

Ray Kamps

Principal **Field Sales** Engineer
Microchip Technology
Office (216) 750-6178
Cell (440) 667-1057

EX2006, 4

Kurt Ebert

Regional **Sales Manager** - Southeast
Microchip Technology
Office: 678-957-9614

EX2007, 2

16 Q. Mr. Canu, who is he?
17 A. Oh, yes. He's one of **the sales**
18 **engineers.**

EX2002 (Trial Tr., Obolsky), 291:16-18

Chris Behal

Microchip Technology Inc.
Sr. **Field Applications Engineer** Great Lakes

EX2006, 3

Stefan Saenger · 3rd

Product Marketing Manager bei Microchip Technology
Mannheim, Baden-Württemberg, Germany · [Contact info](#)

www.linkedin.com/in/stefansaenger

Don Perkins

Sr Manager of **Strategic Marketing**
UNG Products Group
Microchip

EX2008, 3

Unlike Microchip, a POSITA is Presumed to Know All Pertinent Art



Moreover, actual knowledge of the Geschmacksmuster is not required for the disclosure to be considered prior art. To determine patentability, a hypothetical person is presumed to know all the pertinent prior art, whether or not the applicant is actually aware of its existence. [*In re*](#)

In re Carlson, 983 F.2d 1032, 1038 (Fed. Cir. 1992)

Aptiv's "Industry Praise" Misses the Mark

- **Aptiv cites a single "Pace Award"**
 - Only given to those **"new to the automotive industry"** (POR, 74)
 - Awarded by "Automotive News in conjunction with Ernst & Young" (POR, 74), **not the USB industry**
- **Reasons for award:**
 - Include **"lower cost"** and **"small package"** (EX2038, 2)
 - Mr. Dreon's assertions "[b]ased on [] conversations with the judges" are **hearsay** (EX2036, ¶9)
 - EX2038 and EX2039 unauthenticated hearsay internet articles
- **Award is not "objective" evidence of anything**
 - Aptiv **self-nominated** for the award (EX2036, ¶6)
 - Aptiv hosted judges for "site tours" and "lunches" (EX2037, 2)

Organization Name	Winner Title
Valeo	Water-cooled condenser
Valeo	Electric supercharger
Faurecia Emissions Control Technologies	Exhaust System Adaptive Valve
Federal-Mogul Corp.	Hybrid induction-welding for steel pistons
Delphi Automotive	Dual Role Hub
FTE automotive GmbH	Electronic oil pump
Koito Manufacturing Co.	Dual-function LED headlamp
Bosch	Linear Force Solenoid
Gentex Corp.	Full Display Mirror
Magna Closures	Electronic door latch
Faurecia Automotive Seating	Cover Carving Technology for seats
Ichikoh Industries	MonoLED light source
GKN Driveline	Lightweight constant velocity joint

EX1013 (Welch), ¶1305

Aptiv's Commercial Success Argument Fails

- Microchip sales of ***unaccused*** CarPlay hubs dwarfs Aptiv's sales showing that unclaimed features drove sales (EX1104; -228 Reply (Paper 30), 24)
- To the extent Aptiv argues it was the combination of features that drove sales, that argument is self-defeating because **no Challenged Claim requires all three carmaker demands**
- Aptiv also had an **early-mover head-start** advantage
- Aptiv admits that numerous other **non-CarPlay features** (*e.g.*, lighting, cosmetics, etc.) drove demand (*see* EX2042, 182:10-23)
- Aptiv ignores its **lower pricing** (EX2040, 233:4-12)

EX2042 (Trial Tr., Voto), 182:10-23

Aptiv had a Head-Start Early Mover Advantage

12 Q. And at the time that you got
13 introduced to it, CarPlay was under a lot of
14 secrecy?

15 A. It was not publicly known.

16 Q. Right.

17 But it was also under a lot of
18 secrecy, wasn't it?

19 A. Apple is pretty secret about
20 everything they do.

21 Q. So that's a yes?

22 A. Yeah.

EX2003 (Trial. Tr., Voto), 149:12-22

6 Q. And at that point, you realized you
7 were lucky being in that position; right?

8 A. Yeah, it was quite fortunate that we
9 were in a position where we needed to --
10 perhaps I'm speculating a bit -- but I believe
11 when I made those statements under oath, as I
12 do today, that we were probably one of the
13 first ones to find out about this new thing
14 that car -- this CarPlay thing that Apple was
15 trying to do.

EX2003 (Trial. Tr., Voto), 157:6-15

Aptiv had a Head-Start Early Mover Advantage

13 Apple and Jaguar are talking to
14 each other and they're saying hey, you know,
15 we are going to have this new CarPlay thing.
16 Jaguar, here are some of the requirements,
17 right, this is what you have to do to make it
18 work.

EX2003 (Trial. Tr., Voto), 108:13-18

6 So that's how we found out, is
7 really because of the fact that we had earned
8 that business with Jaguar and we were in the
9 middle of developing it, at the same time that
10 Jaguar was talking to Apple, it just became,
11 you know, natural for Jaguar to start feeding
12 us some of these requirements.

EX2003 (Trial. Tr., Voto), 109:6-12

Aptiv Admits Other Reasons Drove Product Sales

- Aptiv's Product Line Director (Mr. Dreon) identified other reasons for sales

10 Q. What about features not related to
11 CarPlay, any of those you care about?

12 A. Yes, absolutely. So you've seen
13 examples of these products. They come with a
14 cosmetic component, and so that's very
15 important to our customers. These are
16 integrated into the dashboard and the look and
17 feel of the vehicle, and so the color of it,
18 the texture of it, it's very important, as
19 well.

20 And the example you see, they are
21 also illuminated, and so the illumination and
22 matching the colors and the intensity within
23 the dashboard is very important to CarPlay.

EX2042 (Trial. Tr., Dreon), 182:10-23

Aptiv Ignores Numerous Other Factors

Challenged Claims require none of these, and Microchip's substantial unaccused hub sales indicate PO's sales were due to other factors. PO ignores other factors affecting sales such as Apple's brand name, lower pricing (EX2040, 233:4-12), marketing, etc. The impact of Apple's certification and brand name (as perhaps the most recognized company on the planet) cannot be ignored.

-228 Reply (Paper 30), 26

Aptiv Ignores Numerous Other Factors

The next sentence, as you see there, refers to or references "Unwire Carplay silicon solution is around \$1.60 range."

Can you provide some context for the jurors on how Unwired's pricing at this time compared to Microchip's pricing on its own USB hub chips?

A. Yes. So at this point of time, in the reasonable absence of competitors, we were selling products for about \$3 each, and this was roughly half of what we were selling them for.

EX2040 (Trial. Tr., Obolsky), 233:1-12

THE PATENT SPECIFIC ISSUES

The Patent Specific Issues

- **Petitioner's Combination (Chang + Chang II + Chutorash)**
- **Petitioner's Combination (Chang + Chang II + AN96527)**
- **Aptiv's argument re "hub control unit 46" vs. "hub 40"**
 - '072 claim 1
 - '420 claims 1-12, 15-17 (framed as "interconnected to" argument)
 - '962 all claims (framed as "interconnected to" argument)
- **Aptiv's "multiplexing switches" argument ('072 claim 1; '962 claim 6)**
- **Aptiv's "analog switch" ('962 claim 6) and "digital routing logic" ('962 claim 10)**

The Patent Specific Issues (cont'd)

- **Aptiv's "multiple simultaneous connections" argument**
 - '420 claims 2, 8, 16-17, 19-20
 - '962 claims 2 and 15 (and 5 and 16)
- **Aptiv's "plurality of ... consumer devices" argument ('962 claims 5 and 16)**
- **Aptiv's "bypassing the USB bridge" argument ('643 all claims; '420 claim 14)**
- **Aptiv's "custom IC" argument ('420 claim 14)**
- **Aptiv's "isochronous" argument ('643 claims 2, 7, 13; '962 claim 9)**
- **The scrivener's error ('420 claims 18-20)**

PETITIONER'S COMBINATION (CHANG + CHANG II + CHUTORASH)

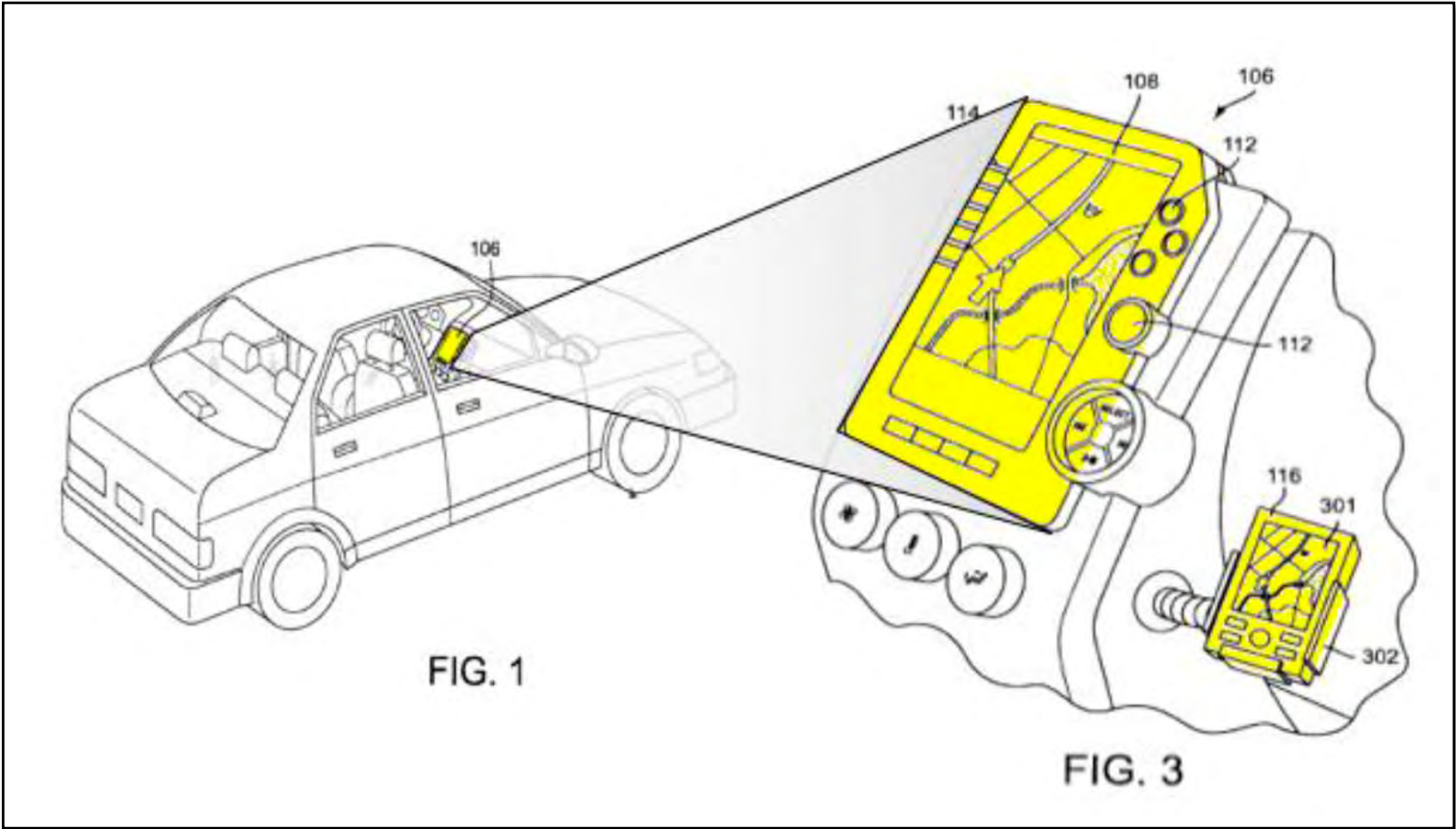
A POSITA Would Be Motivated to Combine Chang, Chang II, and Chutorash

- Chang, Chang II, and **Chutorash**
 - '072 Patent Ground 2 (Claim 1)
 - '643 Patent Ground 2 (Claims 2, 7, 13)
- **Chutorash** discloses using a USB hub in a vehicle
- A POSITA would have been motivated to combine Chutorash with Chang's modified hub with a reasonable expectation of success
- Aptiv's Chutorash arguments are cumulative to Ground 1 (-230 POR (Paper 25), 53-54; -011 POR (Paper 25), 48-49)

Chutorash (EX1029)

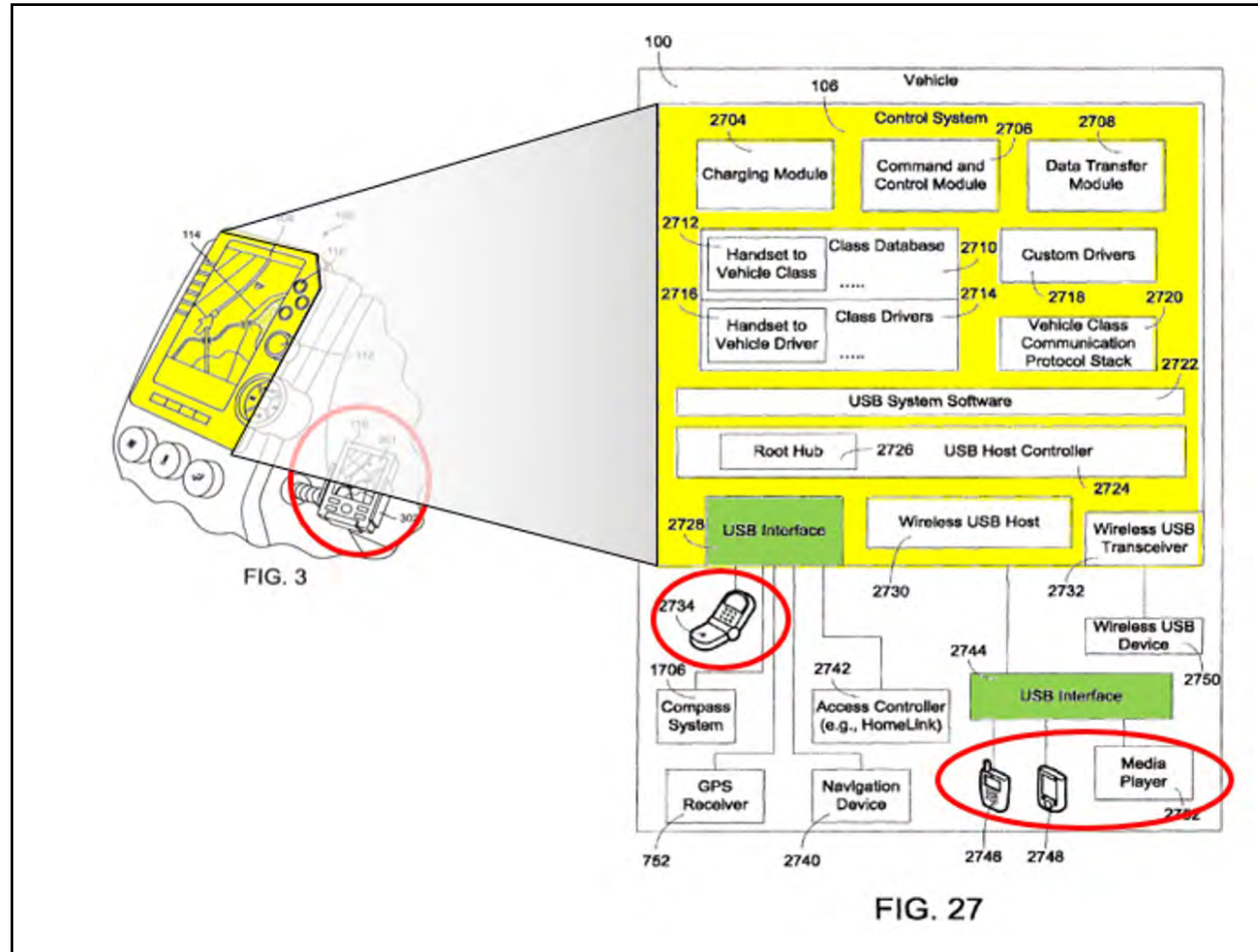
- **U.S. Pat. 8,447,598 to Chutorash**
- **Title:** “Vehicle User Interface Systems and Methods”
- **Filed:** January 14, 2011
- **Prior art:** §102(a)(2)

(12) United States Patent		(10) Patent No.:	US 8,447,598 B2	
Chutorash et al.		(45) Date of Patent:	May 21, 2013	
(54) VEHICLE USER INTERFACE SYSTEMS AND METHODS		(56) References Cited		
		U.S. PATENT DOCUMENTS		
(75)	Inventors: Richard J. Chutorash , Rochester Hills, MI (US); Elisabet Anderson , Holland, MI (US); Rodger W. Eich , Holland, MI (US); Jeffrey Golden , Holland, MI (US); Philip J. Vanderwall , Marne, MI (US); Michael J. Sims , Zeeland, MI (US)	4,390,877 A	6/1983	Curran
		4,760,394 A	7/1988	Takesuchi et al.
		(Continued)		
		FOREIGN PATENT DOCUMENTS		
		EP	0 660 542 A1	6/1995
		EP	1 052 609 B1	11/2000
		(Continued)		
(73)	Assignee: Johnson Controls Technology Company , Holland, MI (US)	OTHER PUBLICATIONS		



Chutorash (EX1029), Figs. 1, 3

Chutorash (EX1029)



Chutorash (EX1029), Figs. 3, 27

A POSITA Would Be Motivated to Combine Chang, Chang II, and Chutorash

Moreover, the desirability of being able to plug a smartphone (or other USB product) into any USB port in the car (*e.g.*, including in passenger seat or backset) would also have motivated a POSITA to use a hub with dual-role ports. *Id.*, ¶208.

-230 Petition (Paper 1), 75

POSITA would have been motivated to use a USB hub with host-to-host capabilities because “[v]ehicle control system 106 could be classified as an embedded host” and various USB products (*e.g.*, mobile phone 2734, media player 2752, etc.) are precisely the types of products that typically act as USB hosts. EX1029, 27:1-30; Welch, ¶206. Further, Chutorash discloses that the “[v]ehicle

Id., 74

A POSITA Would Be Motivated to Combine Chang, Chang II, and Chutorash



103. By 2013, USB deployments in vehicles were common, including using hubs to increase the available downstream ports. For example, by 2002, USB hubs were already used in automobile entertainment systems. *See* EX1016 (Overtoom), Title, Abstract, and Fig. 1 (describing a “*Dual-Role Compatible USB Hub*” for “*vehicle entertainment systems*”).

-230 EX1013 (Welch), ¶130

A POSITA Would Be Motivated to Combine Chang, Chang II, and Chutorash

USB In Automotive: No Longer Just For PCs

Media inside the automobile...

Universal Serial Bus (USB) has long been the ubiquitous standard for PC peripheral connectivity, but recently it has started venturing into the automotive market. MP3-supported stereos, DVD players and advanced GPS navigation

EX1049 (USB in Automotive: No Longer Just for PCs), 1

simply a band-aid until stereos incorporate direct connections. Infotainment also includes touch-screen navigation equipment, fold-down video screens and mobile-phone speaker systems: suddenly the car has become a PC on wheels.

Id.

The automotive industry does not need to reinvent the wheel: nearly all consumer electronics are PC-dependent for some form of functionality (downloading MP3s, uploading pictures, etc.), and the connection most widely used is USB - so the automotive industry already has a universal standard to take advantage of.

Id.

A POSITA Would Be Motivated to Combine Chang, Chang II, and Chutorash

Requirements for flexibility and scalability in addition to rising data rates offered only one way, back to branched star networks. The trend is using USB 2.0 connectivity in a cascaded star connection. As USB 2.0 offers up to 480 Mbit/s data capacity, is easily scalable. USB interconnection can attach a vast number of devices, so it fulfils all requirements. It is future safe for the next decade of years.

Figure 6 displays a modern car entertainment architecture based on USB 2.0 connectivity.

Entertainment sources, such as over-the-air broadcasting systems as well as in-vehicle sources, provide demodulated digital information on one USB-branch to the main entertainment controller.

EX1050 (The Car Entertainment System), 19

A POSITA Would Have Had a Reasonable Expectation of Success



209. A POSITA would have had more than a reasonable expectation of success using the modified Chang USB hub in the vehicle control system of Chutorash for several reasons. First, USB products in 2013 were widespread and well understood, and the connection schemes of these elements (a hub to downstream products) was part of the well-known USB standards. *See* §§VI.A, VI.A.1, and VI.A.2. Second, an embedded vehicle control/infotainment systems is similar to a PCs. *See* §VI.D. In other words, the implementation is highly similar to basic USB deployments in the context of PCs.

-230 EX1013 (Welch), ¶1209

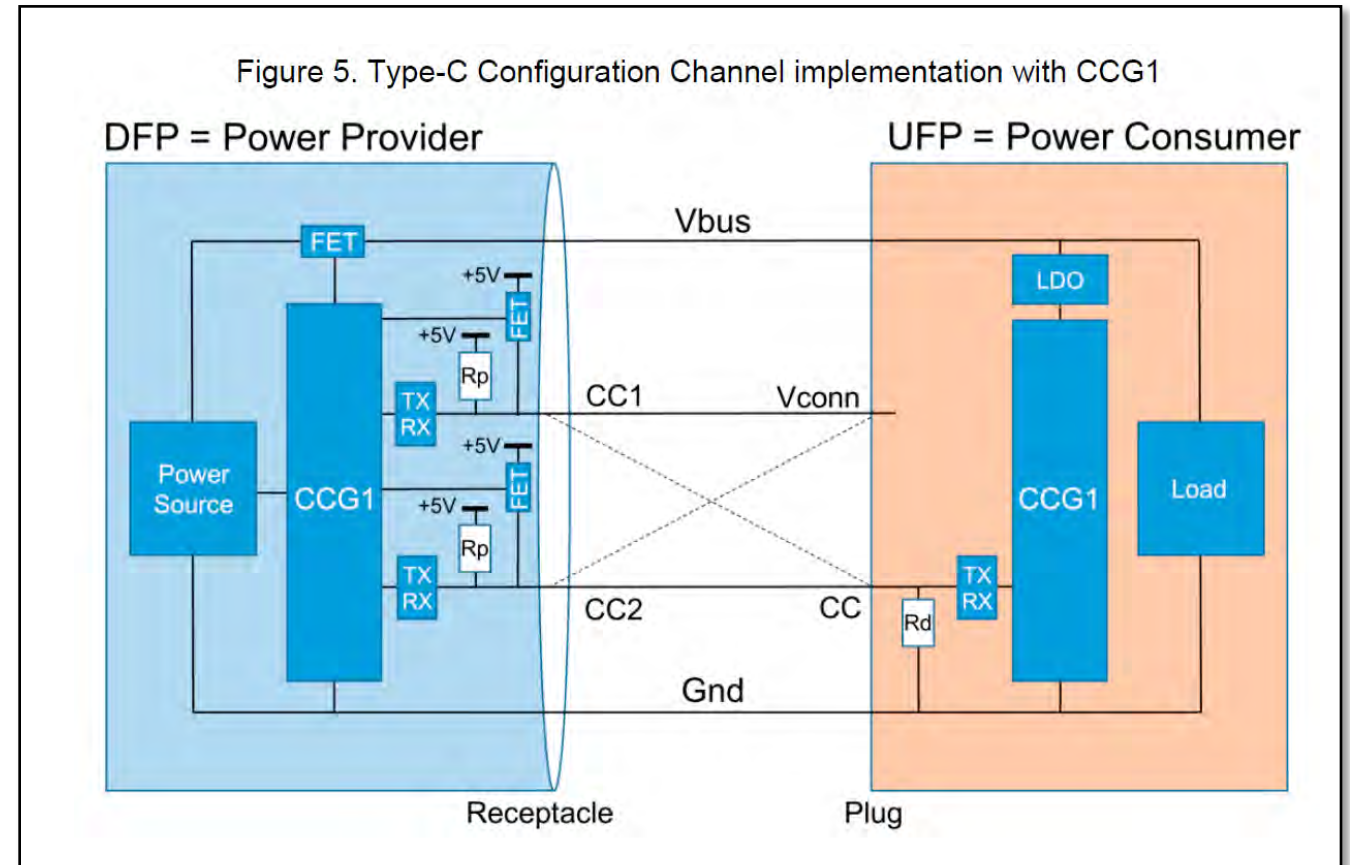
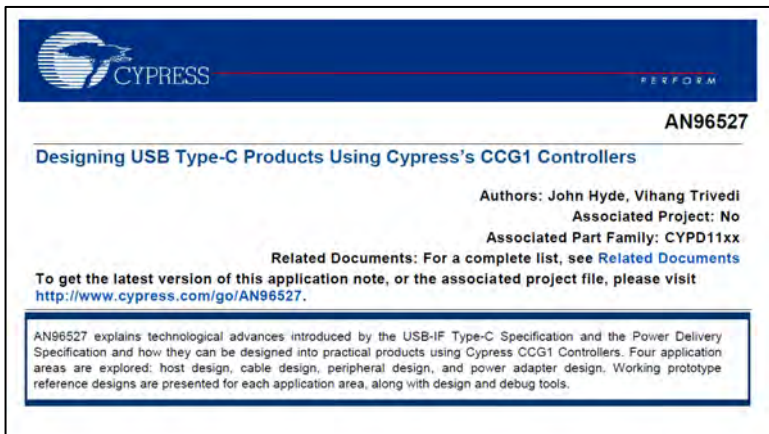
PETITIONER'S COMBINATION (CHANG + CHANG II + AN96527)

Chang, Chang II, and AN96527

- '962 Patent Ground 2: Chang, Chang II, and **AN96527**
- Claims 11-13 and 18-19 (Sept. 6, 2016 priority date)
- **AN96527** adds adjustable power delivery teachings (and underlying USB-PD standard)
- A POSITA would have been motivated to combine AN96527 with Chang's modified hub with a reasonable expectation of success

AN96527 (EX1064)

- **Cypress Semiconductor Application Note AN96527**
- **Title:** “Designing USB Type-C Products Using Cypress’s CCG1 Controllers”
- **Published:** no later than December 21, 2015
- **Prior art:** §102(a)(1)



AN96527 (EX1064), Fig. 5

Motivation to Combine

- A POSITA would have been motivated to make the following three combinations with a reasonable expectation of success:
 - Chang + Chang II
 - Chang + Chang II + Chutorash
 - Chang + Chang II + AN96527

A POSITA Would Be Motivated to Combine Chang, Chang II, and AN96527

- A POSITA would combine AN96527 for three primary reasons:
 - (1) to enable better and more convenient charging capabilities (*e.g.*, eliminates the need for separate wall-socket chargers and reduces the number of cables)
 - (2) to provide flexible as-needed power capabilities for changing power requirements
 - (3) it teaches “[a] hub now plays a much more important role because it can manage and distribute up to 100W of power for each Type-C port,” making it feasible “to power and/or charge a laptop” or other USB product using the USB data cable (EX1064, 25)
- Aptiv raises no unique arguments against Ground 2 (*see* -229 POR (Paper 24), 65-66)

A POSITA Would Be Motivated to Combine Chang, Chang II, and AN96527

This application note first looks at Power Delivery (PD) and how it is architected and implemented. All USB products, at all speeds, can take advantage of Power Delivery as a power provider, power consumer, or sometimes both, including dynamically changing roles. Up to 100 W can be distributed on a Type-C cable, meaning that even a tablet or notebook can be bus-powered.

EX1064 (AN96527), 1

A hub now plays a much more important role because it can manage and distribute up to 100 W of power for each Type-C port. Each port can be a power provider or power consumer, and it is now feasible for a docking station or powered monitor to power and/or charge a laptop or tablet using the same single Type-C cable used for data.

Id., 25

A POSITA Would Have Had a Reasonable Expectation of Success

- A reasonable expectation of success exists because AN96527:
 - (1) teaches its applicability to USB hubs (EX1064, 6)
 - (2) provides “[w]orking prototype reference designs” (id., 1)
 - (3) “includ[es] full schematics and application software” (id., 26)

A POSITA Would Have Had a Reasonable Expectation of Success

This application note showed that all forms of Type-C design can be implemented with the CCG1 controller. **The reference designs, including full schematics and application software, will get you off to a running start.** The examples are based on SuperSpeed, but remember that Type-C Power Delivery is also applicable to USB 2.0 high-speed systems.

EX1064 (AN96527), 26

AN96527 explains technological advances introduced by the USB-IF Type-C Specification and the Power Delivery Specification and how they can be designed into practical products using Cypress CCG1 Controllers. Four application areas are explored: host design, cable design, peripheral design, and power adapter design. **Working prototype reference designs are presented for each application area, along with design and debug tools.**

Id., 1

Figure 4 shows the power delivery signals of a downstream facing port (DFP), which would be a host or a hub and is typically a power provider, and a directly connected (no intervening cable) upstream facing port (UFP), which would be a peripheral device such as thumb drive and is typically a power consumer. Only power signals are shown. USB signals will be added later in the application note, and, as explained previously, their operation is independent of the power signals.

Id., 6

Aptiv's “Hub 40” vs “Hub Control Unit 46” Argument Fails

Aptiv's "hub control unit 46" Argument Fails

- Aptiv argues Chang's "hub control unit 46" cannot be the claimed "hub" in '072 claim 1 because:
 - (1) Chang identifies "USB Hub 40—not its subcomponent, Hub Control Unit 46—as its USB hub"
 - (2) Petitioner "identifies USB Hub 46 and USB Hub 40 as the claimed USB Hub"
 - (3) Mr. Welch allegedly "testified that Chang's control unit 46 does not satisfy the definition of a hub"
- *See* -230 POR (Paper 25), 37-38; -229 POR (Paper 29), 17-19
- Aptiv reprises the same argument for '420 claims 1-12 and 15-17 (*see* -228 POR (Paper 25), 36-38)

Aptiv's "hub control unit 46" Argument Fails

- Each of Aptiv's three arguments fails:
 - (1) Dr. Houh admitted "USB hub" is **defined functionally** (EX1087, ¶155 (element 1[d])); EX2001, ¶36) by the USB standard and hub control unit 46 meets that definition
 - (2) "Petitioner presented **alternative theories** due to PO's district court positions"
 - (3) "Mr. Welch testified Chang's 'hub control unit 46' was not the claimed **hub module** in '420 patent claim 1, which requires more components than just a USB hub"
- See -230 Reply (Paper 30), 19-20; Pet. (Paper 1), 48-50, 54-58
- See -228 Reply (Paper 30), 18-19; Pet. (Paper 1), 42-44, 50-52
- See -229 Reply (Paper 29), 18-19; Pet. (Paper 1), 43-45, 49-51

Aptiv's "hub control unit 46" Argument Fails

- Dr. Houh admitted "USB hub" is ***defined functionally*** (EX1087, ¶155 (element 1[d]); EX2001, ¶36) by the USB standard



The ability to broadcast data from an upstream port to each downstream USB port and to transmit data from each downstream port to an upstream port is fundamental to USB hubs. As explained in Chapter 11 of the USB 2.0 specification, "[i]n the downstream direction, hubs operate in a broadcast mode. When a hub detects the start

-228 EX1087 (Houh), ¶155

Aptiv's "hub control unit 46" Argument Fails

- Dr. Houh admitted "USB hub" is ***defined functionally*** (EX1087, ¶155 (element 1[d]); EX2001, ¶36) by the USB standard



36. The components of a USB network connect via physical connection interfaces called ports. While these connections can be direct, it is common to employ an intermediate device called a hub. A hub is a device that routes multiple downstream ports to a single upstream port. Using a hub allows the host to have

EX2001 (Houh), ¶36

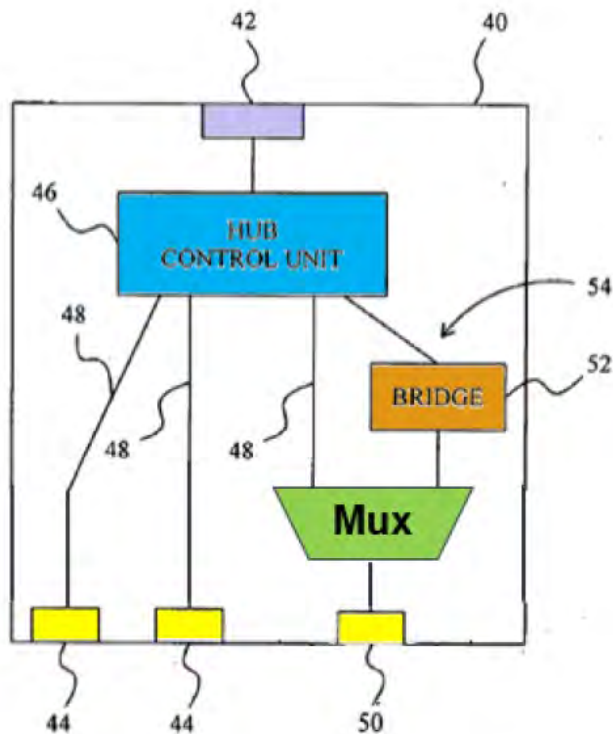
Hub

A USB device that provides additional connections to the USB.

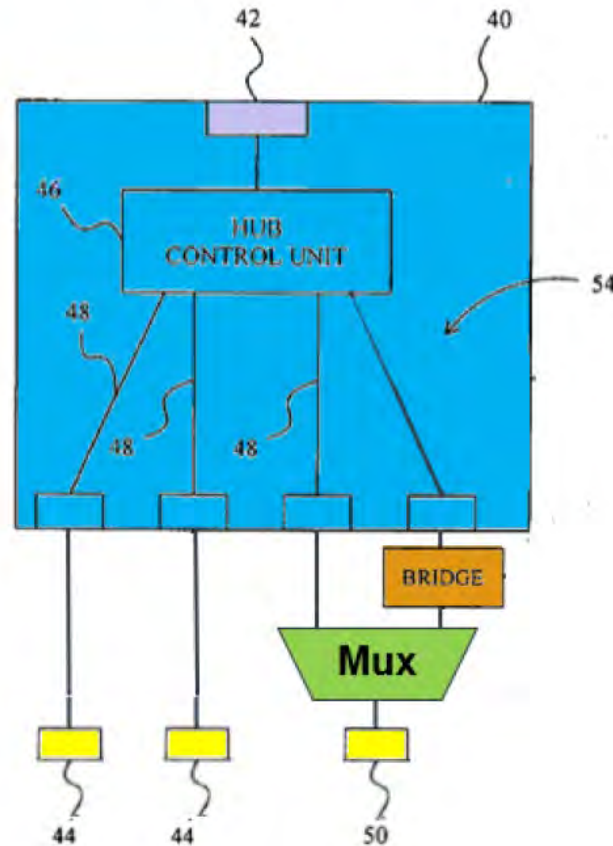
EX1018 (USB 2.0 Spec), 34

Petitioner Proposes Alternative “Hub 40” and “Hub 46” Invalidity Reads

Chang (Hub 46)



Chang (Hub 40)



Aptiv's “interconnected to” Argument Fails

PO argues Chang's hub 40 cannot be *interconnected to* a *bridge* and *routing switch* because Chang's bridge 52 and crossbar are inside hub 40. POR, 37-38.

PO conflates Petitioner's “hub control unit 46” embodiment (mapping Chang's

hub control unit 46 to *hub*) and Petitioner's alternative “hub 40” embodiment

(mapping Chang's hub 40 to *hub*). Pet., 42-44, 52-54. Nowhere does Petitioner

assert the *hub* is *interconnected to* either a *bridge* (Chang's bridge 52) or *routing*

switch (crossbar) inside the *hub*. *Id.*, 52-56.

-228 Reply (Paper 30), 19

Aptiv's "hub control unit 46" Argument Fails

- Read in context, Mr. Welch testified Chang's "hub control unit 46" was not the claimed ***hub module***, which requires more than just a USB hub

14 THE DEPONENT: The short answer is no. This
15 construct in claim 1 is something that's more than a
16 hub. It may contain a hub, but it also has other
17 things. Let's ignore the preamble for a moment, but

EX2021 (Welch Tr.), 215:6-23

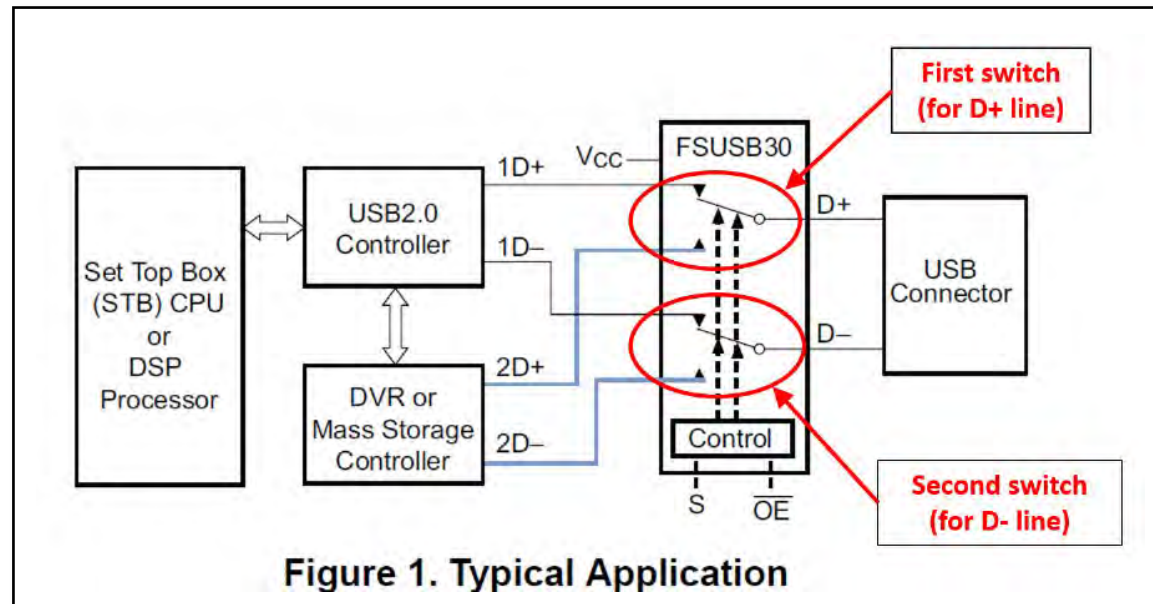
1. A Universal Serial Bus (USB) hub module, comprising:
a first USB port configured to be connected to a USB host;
a second USB port configured to be connected to a
consumer device;

EX1003 ('420 patent), Claim 1 (partial)

Aptiv's “Multiplexing Switches” Argument Fails

Aptiv's "Multiplexing Switches" Argument Fails

- Aptiv argues a USB mux does not have multiple "switches" ('072 claim 1) (-230 POR (Paper 25), 37-41; -229 POR (Paper 24), 49-50)
- But a USB mux has both D+ and D- data lines (for differential signaling) and a switch for each one

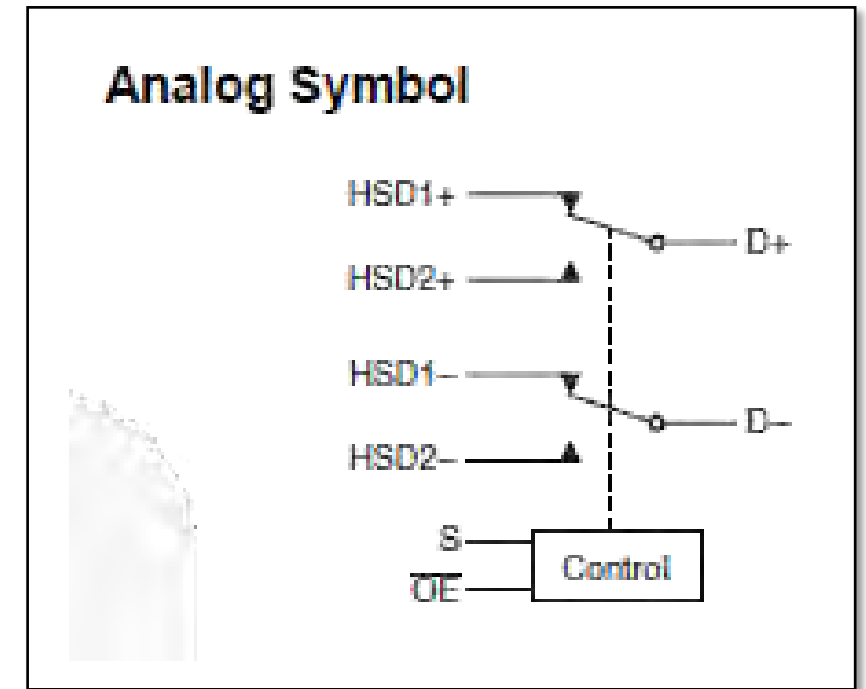


EX1068 (Mux Datasheet), 1 (annotated); see also EX1063, 8; EX1060, 1

Aptiv’s “Analog Switch” and “Digital Routing Logic” Arguments Fail

Aptiv's “Analog Switch” and “Digital Routing Logic” Arguments Fail

- Aptiv argues a mux/crossbar cannot have “analog multiplexing switches” ('962 claim 6, -229 POR (Paper 24), 49-50) and “digital routing logic” ('962 claim 10, -229 POR (Paper 24), 53)
- But a USB mux (and crossbar) is controlled by **digital** select line(s) (*viz.* “digital routing logic”) but pass **analog voltages** between the D+ and D- data terminals



EX1068 (Mux Datasheet), 2

Aptiv's “Multiple Simultaneous Connections” Argument Fails

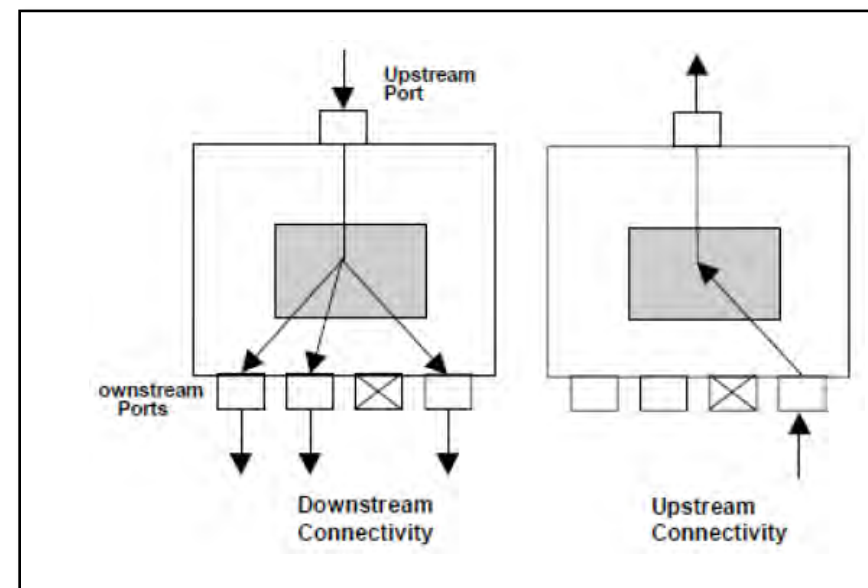
Aptiv's "Multiple Simultaneous" Connections Argument Fails

- Aptiv asserts the Proposed Combination cannot support "multiple simultaneous" connections because it "lacks the requisite control logic" (*see* -228 POR (Paper 25), 38-40; -495 POR (Paper 20), 47-51; -229 POR (Paper 24), 39-41)
 - '420 claims 2, 8, 16-17, and 19-20
 - '962 claims 2 and 15
- This argument fails for two reasons:
 - (1) The reason USB hubs exist is to provide multiple simultaneous connections
 - (2) Petitioner provided more information about constructing/controlling a crossbar (*viz.*, routing switch) than the '420 patent. Compare EX1003 (silent regarding logic for routing switch control) with -228 EX1013 (Welch), ¶¶88-96, 250-254

Aptiv's "Multiple Simultaneous" Connections Argument Fails

65. USB hubs are fundamental to USB architecture. *See* EX1018, Chapter 11 ("*Hub Specification*"). The USB 2.0 Specification defines the term "*hub*" as a "*USB device that provides additional connections to the USB.*" *Id.*, 34. A typical

facing ports ("DFP") (shown above as Port #1-7).³ Hubs support the simultaneous connection of multiple devices to one host. That is, "[i]n the downstream direction, hubs operate in a broadcast mode" (*id.*, §11.1.2.1), such that the upstream host communications are sent to all downstream ports with corresponding connections to downstream devices (*id.*). *See also id.*, 33, 38. USB 2.0 Specification Fig. 11-2



EX1018 (USB 2.0 Spec), Fig. 11-2

EX1013 (Welch), ¶165

Aptiv's "Multiple Simultaneous" Connections Argument Fails

control) with Welch, ¶¶88-96, 250-254. Thus, PO employs a double standard, requiring more of the prior art than the Challenged Patent teaches. *See In re Paulsen*, 30 F.3d 1475, 1481 n.9 (Fed. Cir. 1994) (noting the specification would not be enabling if held to the same standard urged for the prior art); *In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994) (similar). The Challenged Patent says nothing because the "logic" for crossbar control is straightforward and within a POSITA's knowledge/skill (and is shown in datasheets). Welch, ¶¶91-99, 254.

-228 Reply (Paper 30), 20

Aptiv's "Multiple Simultaneous" Connections Argument Fails

8/08

EVALUATION KIT
AVAILABLE

MAXIM

USB 2.0 Hi-Speed 2-of-4 Crosspoint Switch

EX1063 (USB Switch Datasheet), 1

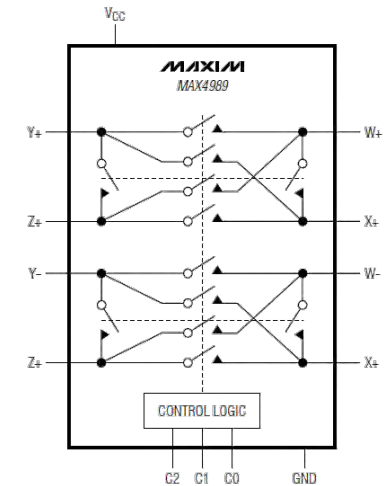
Control Logic Inputs

The MAX4989 provides three control logic inputs, C0, C1, and C2, to control the switch connections as shown in the *Functional Diagram/Truth Table*. Driving the control logic inputs rail-to-rail minimizes power consumption.

EX1063 (USB Switch Datasheet), 7

MAX4989

Functional Diagram/Truth Table



MAX4989			
C2	C1	C0	SWITCH
0	0	0	SHUTDOWN
0	0	1	W AND X CONNECTED
0	1	0	W AND Y CONNECTED
0	1	1	W AND Z CONNECTED
1	0	0	X AND Z CONNECTED
1	0	1	X AND Y CONNECTED
1	1	0	Y AND Z CONNECTED
1	1	1	SHUTDOWN

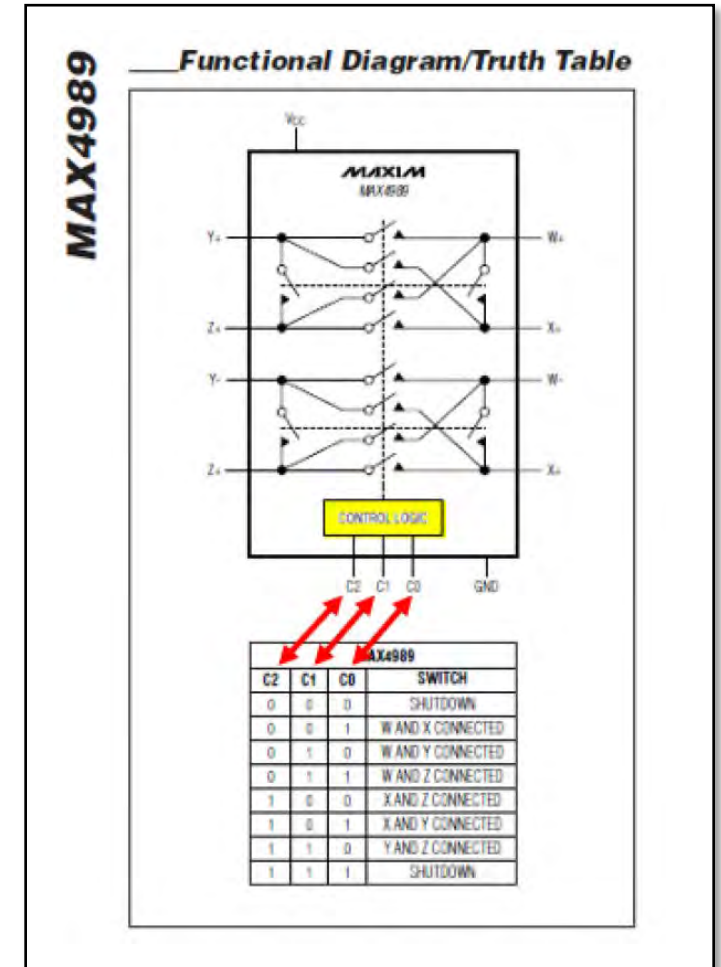
EX1063 (USB Switch Datasheet), 8

Aptiv's "Multiple Simultaneous" Connections Argument Fails

EX1060, Fig. 1 (annotated). Another example comes from the datasheet for Maxim's "USB 2.0 Hi-Speed 2-of-4 Crosspoint Switch" which includes the truth table below that defines the switching paths controlled by the control signals C0, C1, and C2.

259. The operation and programming necessary to perform the appropriate routing was very well-known to POSITAs and trivial to implement. Indeed, basic multiplexer functionality was commonly described in engineering textbooks. See, e.g., EX1055 (Baker), 284-288 ("control lines" for switching); see also EX1015 (Chang II), [0038] ("CPU 135" receives the host/device detection signal to "control[]" switching). A POSITA would have naturally integrated detection

-228 EX1013 (Welch), ¶¶258-259



EX1063 (USB Switch Datasheet), 8 (annotated)

Aptiv's “Plurality of ... Consumer Devices” Argument Fails

Aptiv's "Plurality of ... Consumer Devices" Argument Fails

- Aptiv asserts the Proposed Combination fails to disclose “a plurality of at least two consumer devices” (*see* -229 POR (Paper 24), 48-49)
 - '962 claims 5 and 16
- This argument fails on its face for the same reason Aptiv's “multiple simultaneous connections” argument fails (*viz.*, the modified Chang hub plainly has multiple downstream ports that support multiple USB consumer product connections)

Aptiv's “Bypassing the USB Bridge” Argument Fails

Aptiv's "Bypassing the USB Bridge" Argument Fails

- Aptiv asserts the Proposed Combination cannot “bypass[] the USB bridge” (’643 all claims) because “Chang II’s detection unit is part of the bridge” (*see* -011 POR (Paper 25), 33)
- Aptiv makes substantially the same argument for ’420 claim 13 (*see* -495 POR (Paper 20), 38-40)
- This argument:
 - (1) is circular and makes no sense because Aptiv acknowledges Petitioner disclosed locating the detection unit “proximate to or integrated with the multiplexer” (*i.e.*, not in the bridge) (*see id.*)
 - (2) relies on the false premise that Petitioner bodily incorporated the entirety of Chang II’s “bridge device”
 - (3) ignores that Petitioner’s combination plainly shows the bridge being bypassed

Aptiv's "Bypassing the USB Bridge" Argument Fails

- The Petition plainly discloses locating the detection unit **outside the bridge** (e.g., "locat[ing] the detection unit proximate to (or integrated with) the switch") (-011 Petition (Paper 1), 49)
- The Petition further explains locating the detection unit **on the same chip** as the switch (-011 Petition (Paper 1), 72-75)
- Aptiv admits "[a POSITA] would understand that the step of determining whether the consumer device is operating in the USB host mode or in the USB device mode is **performed by the USB routing switch.**" EX1072, 597 (emphasis added)

Aptiv's "Bypassing the USB Bridge" Argument Fails

- Dr. Houh admits "it would be natural" to locate the detection unit in the routing switch



116. Given that some claims require the routing switch to include the signal detection circuit whereas others do not, a POSITA would understand that the location of the signal detection circuit was a matter of design choice. Because of the functional relationship between the signal detection circuit and the routing switch, it would be natural to implement a routing switch that includes the signal detection circuit. The method of claims 4 and 9 could be performed with such a system, assuming the other limitations were met. Alternatively, the signal

EX2001 (Houh), ¶116

Aptiv's "Bypassing the USB Bridge" Argument Fails

- "PO conjures its argument only by implicitly contending Petitioner bodily incorporated Chang II into Chang's bridge 52" (-011 Reply (Paper 30), 14)

⁶ PO seeks to capitalize on Chang II's generic reference to its entire device (including CPU, control chip, detection unit, memory, buffer unit, etc.) as a "bridge device." The Board should reject PO's sleight of hand.

-011 Reply (Paper 30), 14

Bodily Incorporation is Not the Test

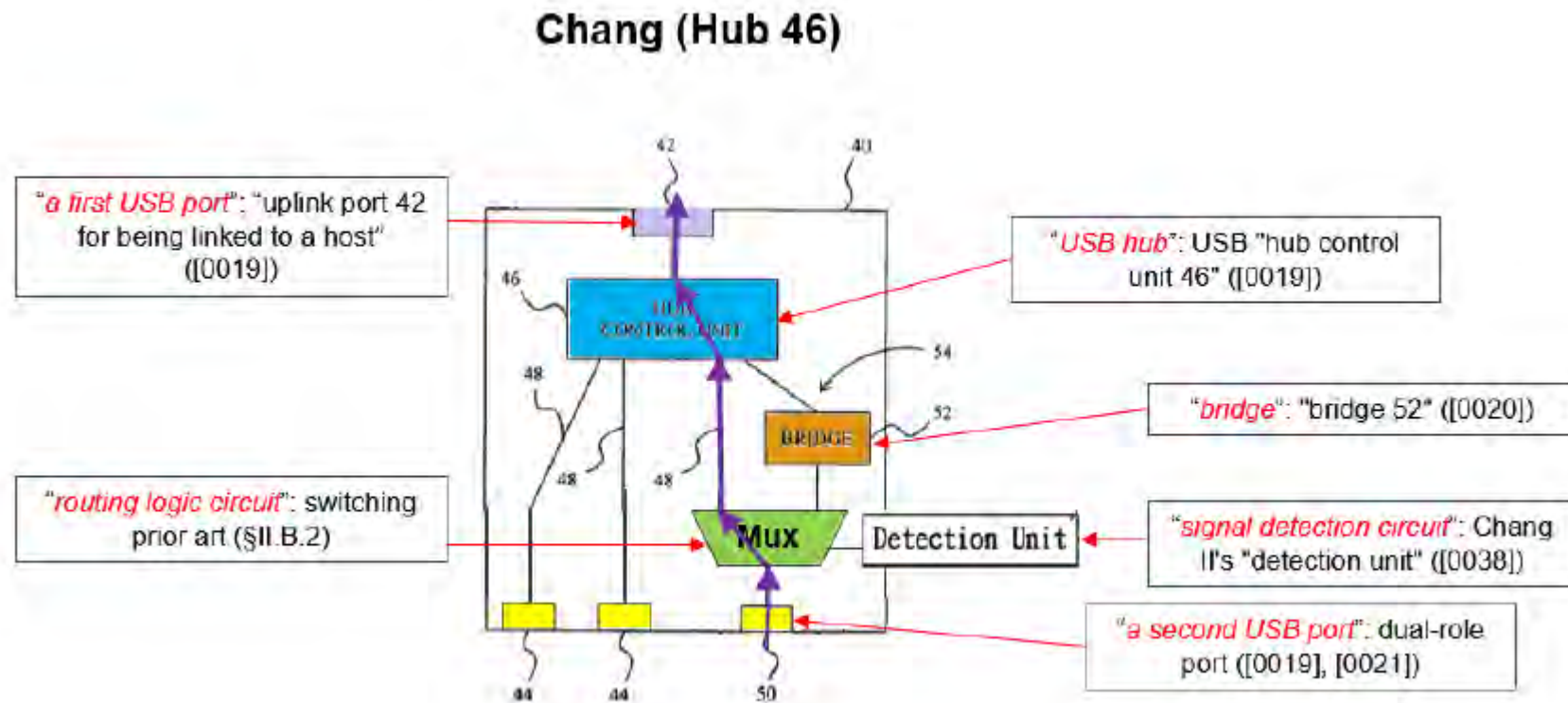
To justify combining reference teachings in support of a rejection it is not necessary that a device shown in one reference can be physically inserted into the device shown in the other. *In re Griver*, 53 CCPA 815, 354 F.2d 377, 148 USPQ 197 (1966); *In re Billingsley*, 47 CCPA 1108, 279 F.2d 689, 126 USPQ 370 (1960). The test for obviousness is not whether the **[**34]** features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. *In re Wood*, 599 F.2d 1032, 202 USPQ 171

In re Keller, 642 F.2d 413, 425 (CCPA 1981)



Aptiv's "Bypassing the USB Bridge" Argument Fails

- The Petition plainly shows that the host-device connection "bypass[es]" the USB bridge



-011 Petition (Paper 1), 68

Aptiv's “Custom IC” Argument Fails

Aptiv's "Custom IC" Argument Fails

- Aptiv argues host/device detection cannot be “performed by the USB routing switch” because “IC design is a complex field posing non-trivial technical challenges, and requiring specific electronic design expertise” (-495 POR (Paper 20), 38-39)
- But the prior art, Dr. Houh, and Aptiv itself contradict this position (-495 Reply (Paper 25), 19-21)

Chang Discloses IC Integration

[0022] To an integrated circuit (IC) designer, it is possible to integrate the bridge 52 within the hub control unit 46, and thereby the hub control unit after integration will comprise both of a conventional hub control unit and a conventional bridge. The accompanying drawings and detailed description of the present invention are designed for illustration merely, and not intended to limit the present invention to the specific type of embodiments.

Chang (EX1014), [0022]

Chang II Discloses Integration

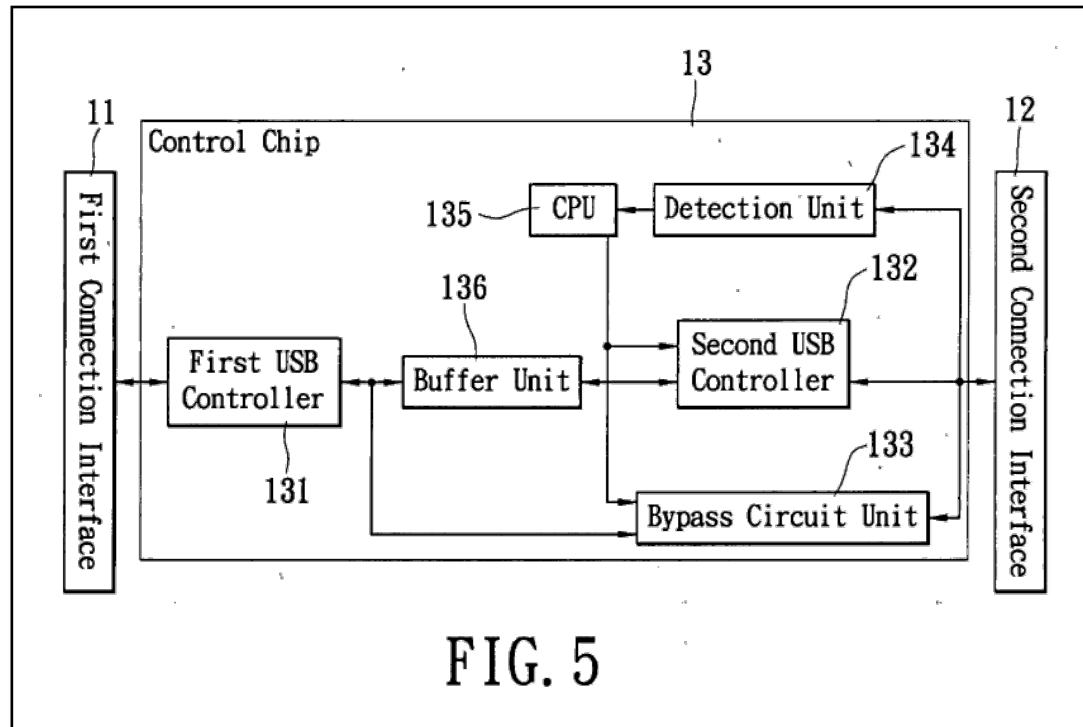


FIG. 5

Chang (EX1015), Fig. 5

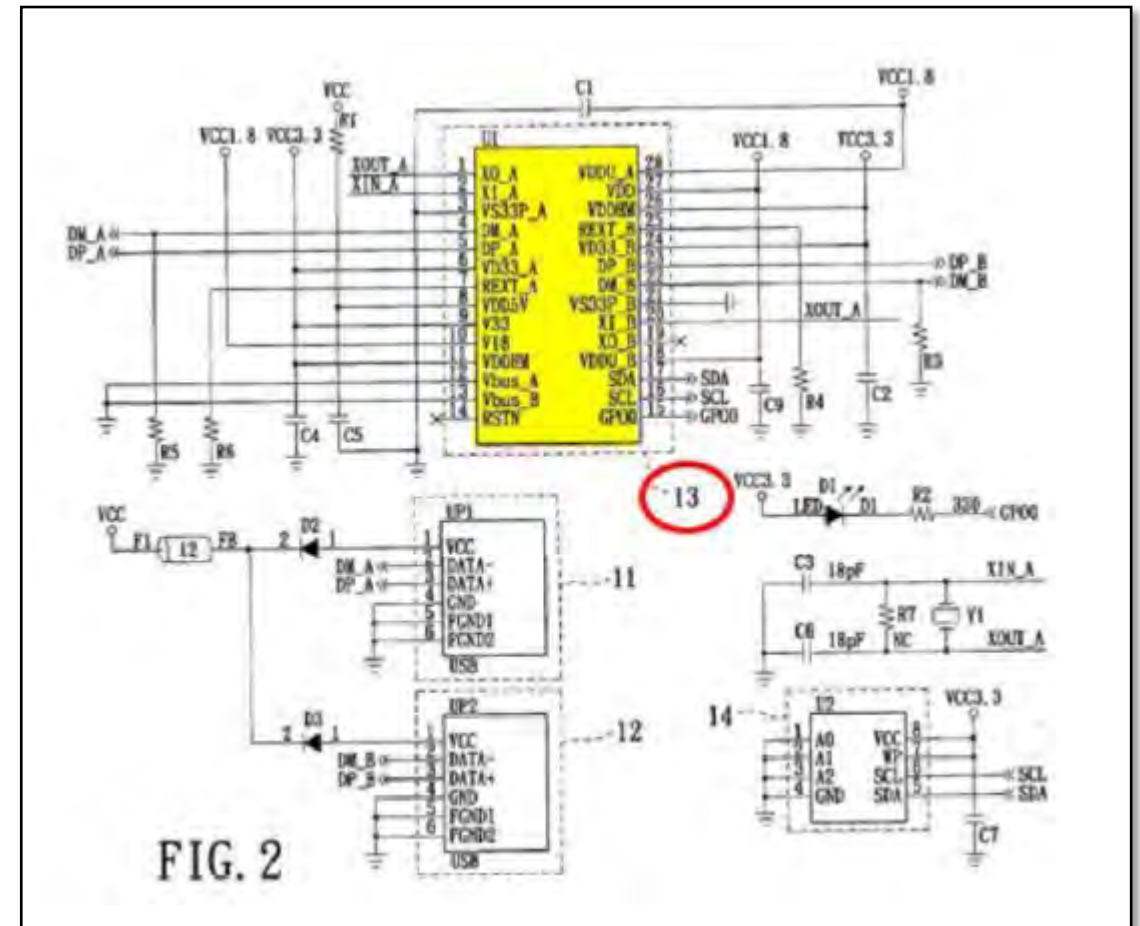


FIG. 2

Chang (EX1015), Fig. 2 (annotated to show control chip 13)

Aptiv's "Custom IC" Argument Fails



116. Given that some claims require the routing switch to include the signal detection circuit whereas others do not, a POSITA would understand that the location of the signal detection circuit was a matter of design choice. Because of the functional relationship between the signal detection circuit and the routing switch, it would be natural to implement a routing switch that includes the signal detection circuit. The method of claims 4 and 9 could be performed with such a system, assuming the other limitations were met. Alternatively, the signal detection circuit could be located elsewhere while still performing the claimed method of the independent claims. As a practical matter, it would be easy for a POSITA to implement either configuration in view of the '643 patent's disclosures and a POSITA's knowledge of the art.

EX2001 (Houh), ¶116

Dr. Houh's Admissions



120. Moreover, in the art of electrical engineering, circuits can be combined with predictable results. For example, because circuits behave predictably when combined, a POSITA could select a desired circuit from the class of signal detection circuits and expect it to work with a given routing switch. Conversely, a variety of routing switches could be used to route the signals in accordance with a determination by a signal detection circuit.

-495 EX1105 (Houh), ¶120
-228 EX2001 (Houh), ¶120 (same)

Dr. Houh's Admissions



121. The same applies to the “including” requirement; separate circuits are frequently combined with predictable results. For example, to perform analog-to-digital conversion, a microcontroller could interface with an analog to digital converter, or it may just as easily include an analog to digital converter circuit. There is no reason to think that known detection circuits could not be included in a routing switch.

-228 EX2001 (Houh), ¶121

Aptiv's Admission

A person of ordinary skill in the art would understand that the step of determining whether the consumer device is operating in the USB host mode or in the USB device mode is performed by the USB routing switch.

-495 EX1072 (Aptiv's Infringement Contentions), 129

-228 EX1072 (Aptiv's Infringement Contentions), 597

Aptiv's “Isochronous” Argument Fails

Aptiv's "Isochronous" Argument Fails

- '643 patent claims 2, 7, 13 (*see* -011 POR (Paper 25), 33-36)
 - “the [] USB host is embedded in an infotainment system”
- '962 patent claim 9 (*see* -229 POR (Paper 24), 50-53)
 - “wherein the endpoint buffers are configured to support a USB data connection pipe between an infotainment system and the consumer device”
- Aptiv construes these claims to require:
 - “real-time” data transfer
 - “streaming” services
 - “mapping, video, and screen mirroring functionality”
 - “isochronous” data transfer

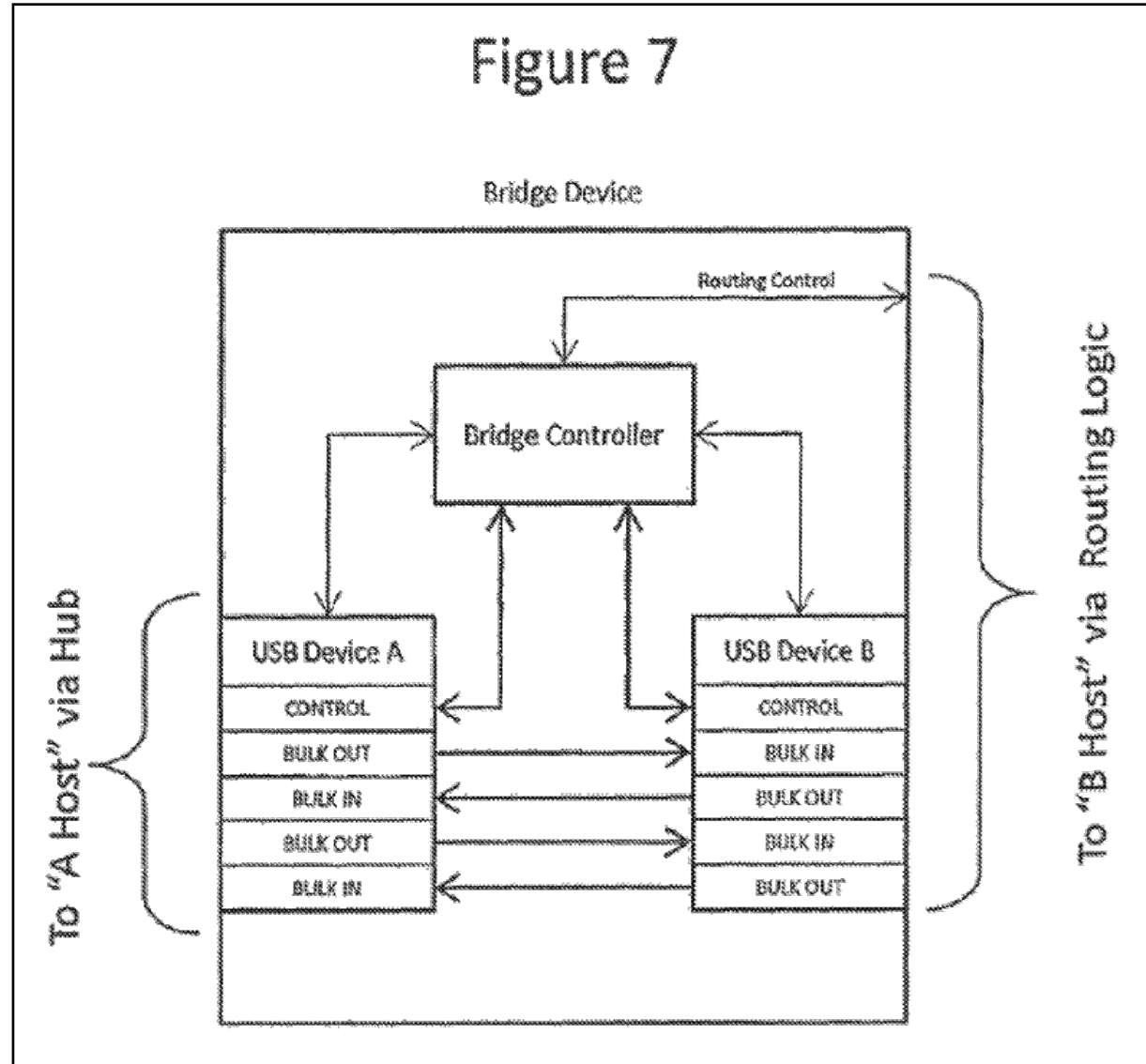
Aptiv's "Isochronous" Argument Fails

- But the claims do not require any of these things
- The patent does not even mention "isochronous" data transfer
- The patent language Aptiv cites is permissive and non-limiting

sengers to connect their consumer devices. Once a consumer device is connected to one of the ports, the device begins charging and the vehicle infotainment system can access content on the consumer device. This is useful to enable features such as streaming music, video and other services the device may provide.

'643 patent (EX1011), 1:57-62

The '643 Patent Does Not Disclose Isochronous Data Transfer



Aptiv's "Isochronous" Argument Fails

- Aptiv admits that the USB standard already provides for "isochronous" data transfer

5.6 Isochronous Transfers

In non-USB environments, isochronous transfers have the general implication of constant-rate, error-tolerant transfers. In the USB environment, requesting an isochronous transfer type provides the requester with the following:

- Guaranteed access to USB bandwidth with bounded latency
- Guaranteed constant data rate through the pipe as long as data is provided to the pipe
- In the case of a delivery failure due to error, no retrying of the attempt to deliver the data

While the USB isochronous transfer type is designed to support isochronous sources and destinations, it is not required that software using this transfer type actually be isochronous in order to use the transfer type.

EX1018 (USB 2.0 Spec), §5.6 (*see also id.*, §4.7.4)

Aptiv's "Isochronous" Argument Fails

- Dr. Houh admitted connecting mobile phones to vehicle infotainment systems was “known,” “common,” and “unremarkable”



quoted in Petitioner's summary stand for the unremarkable proposition that USB was a known method for connecting a mobile phone to a vehicle's infotainment system. (IPR2024-00230, Pet., 39-41; PGR2024-00011, Pet. 39-41.)

EX2001 (Houh), ¶52

37. USB is used in many applications, including the automotive sector. By the early 2010's, it was common for automotive companies to use USB for interfacing devices within a vehicle. Typically, the car's computer or “head unit”

EX2001 (Houh), ¶137

'420 Claims 18 and 19 Contain a Scrivener's Error

'420 Claims 18-19 Contain a Scrivener's Error

- The Board “independent[ly] reviewed” and adopted the district court’s “scrivener’s error” correction in ’420 claim 13. -495 ID (Paper 13), 11-15 (changing USB hub to USB host)
- The Board should now assess whether ’420 claims 18-19 also contain a “scrivener’s error” since no such assessment was necessary (or done) at the Institution phase. *See* -495 ID (Paper 13), 15
- POs withdrawal of its district court contentions after dismissing claims 18-20 does not absolve the Board of its responsibility
- The Petition expressly set forth the construction Petitioner applied

'420 Claims 18-19 Contain a Scrivener's Error

The parties agreed construing claims 18-20 was required to resolve patentability. Pet., 25-27; POPR, 9 n.6, 28. PO asserts claims 18-19 contain a scrivener's error that "is evident from the face of the patent and is not subject to reasonable debate." EX1076, 9. In particular, PO asserts ***USB hub including a first USB port*** (in claim 18) should read ***USB hub [interconnected to] a first USB port***; and ***USB hub includes a third USB port*** (in claim 19) should read ***USB hub [is interconnected to] a third USB port*** (in claim 19). *Id.*, 9-10, 35-40; Pet., 25-26. PO argues correction would conform claims 18-19 with all other patent claims, the primary embodiment of Fig. 4, and the file history. EX1076, 9-10, 35-40.

-495 Reply (Paper 25), 7

'420 Claims 18-19 Contain a Scrivener's Error

The preferable agency action is to seek to serve the agency's assignment under the *America Invents Act*, and to resolve the merits of patentability. Although the Board does not discuss its authority to correct errors, there is foundation for such authority in the America Invents Act, which assured that the Board has authority to amend claims of issued patents. See 35 U.S.C. §

We conclude that the Agency's treatment of this error as the basis of a Final Written **[**18]** Decision of patentability is not a reasonable resolution, and does not comport with the Agency's assignment to resolve patentability issues. On the correct antecedent basis, the petition's issue of obviousness may be resolved by the Board, in furtherance of resolution of the parties' dispute in concurrent district court litigation.

Fitbit, Inc. v. Valencell, Inc., 964 F.3d 1112, 1119-20 (Fed. Cir. 2020)

The Petition Expressly Set Forth the Construction Petitioner Applied

b. 18[a]: “a USB hub [interconnected to]²¹ a first USB port and a second USB port;”

Element 18[a] is broader than claim 13[preamble][ii] and is met by each Crossbar Implementation for substantially the same reasons. Welch, ¶277.

-495 Petition (Paper 2), 73

¹⁴ ’420 patent Figs. 4-5 show the hub “[inter]connected” through routing switch/logic to downstream USB ports. Petitioner applies this interpretation.

-495 Petition (Paper 2), 51

The Petition Expressly Set Forth the Construction Petitioner Applied

For element 18[a], Aptiv asserts that “[a]lthough claim 18 states ‘a USB hub *including* a first USB port and a second USB port,’ a POSA would understand from the surrounding claim language and patent specification that claim 18 should read instead ‘a USB hub *interconnected to* a first USB port and a second USB port.’” EX1072, 186 (emphasis in original). Aptiv makes a similar change to

-495 Petition (Paper 2), 26

Aptiv's Cases are Distinguishable and Support Petitioner

- Unlike *Oyster*, Microchip's Petition plainly set forth its analysis under the same claim construction used in Reply (*i.e.*, there was no new or different claim construction used in Reply). *Contrast Cisco Sys., Inc. v. Oyster Optics, LLC*, IPR2017-01719, Paper 31 at 24-25 (PTAB. Jan. 24, 2019) (“[Petitioner’s Reply] provides for the first time an express claim construction” and petitioner “provid[ed] its explanation based on its claim construction, for the first time, in its Reply”)
- Moreover, the Board in *Oyster* **did** analyze the claim construction issue. *Id.*, 25

Aptiv's Cases are Distinguishable and Support Petitioner

- Unlike *Gce*, Microchip's Petition plainly set forth its analysis under the same claim construction used in Reply (i.e., there was no new or different claim construction used in Reply). *Contrast Gce Gas Control Equip. Inc. v. Vbox, Inc.*, IPR2023-00326, Paper 27 at 11 (PTAB June 18, 2024) (petitioner “[p]resent[ed] a new proposed claim construction for the first time in [its] Reply”); *id.*, 27-28.
- Moreover, the Board in *Gce* **did** analyze the claim construction issue. *Id.*, 29-30.

THE §112 ISSUES ('643 PATENT)

Summary of §112 Grounds

Proceeding	Patent	Claim(s)	Ground	Claim Limitation
PGR2024-00011	'643	1-15	3 (§112(b) indefinite)	“the USB hub and USB bridge have different components and functionality”
		1-15	4 (§112(b) indefinite)	“routing logic circuit”
		1-9	5 (§112(f) indefinite)	“signal detection circuit”
		4, 9, 15	6 (§112(b) indefinite)	“wherein the USB routing switch includes the signal detection circuit”
		4, 9, 15	7 (§112(a) written description)	“wherein the USB routing switch includes the signal detection circuit”

GROUND 3

(different components and functionality)

Ground 3 ('643)

- **Claims:** 1-15
- **Basis:** §112(b) indefiniteness
- **Claim Element:** “the USB hub and USB bridge have different components and functionality”
- Basic claim construction tenets hold that “USB hub” and “USB bridge” already “connote different meanings.” *See Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1333 n.3 (Fed. Cir. 2006).
- It is not reasonably certain what additional “differences” are being claimed

The '643 File History

Authorization for this examiner's amendment was given in a telephone interview with Mr. Robert Myers (Reg. No. 69,783) on April 21, 2023. The examiner proposed amendments to better place the application in condition for allowance, particularly adding the limitation that prior arts fail to teach. Mr. Myers agreed.

EX1012 ('643 File History), 202-203

It is Unclear What the Claim Term “Different” Requires

meaning to *both* the word second *and* the word different.” *Id.* Patent Owner argues “different” must mean something more than not being the first end wall because “that difference was already addressed by the use of the word ‘second.’” *Id.*

We agree with Patent Owner’s argument based on the ordinary meaning of the language of claim 1.² The term “different” indicates a

Arrows Up, LLC v. Oren Techs., LLC.,
IPR2018-01230, Paper 7, 8-9 (PTAB Jan. 14, 2019)

Ground 3 ('643)

However, that the specifications provide these examples does not mean that the patents provide an objective standard for determining what is meant by the term “differently versioned.” For example,

“aesthetically pleasing.” Moreover, to determine the scope of a claim, a person skilled in the art must know not only what falls inside the scope of the claim term, but also what falls outside of it. This knowledge provides a person skilled in the art with the boundaries of the invention. Indeed, to provide a person of skill in the art with the boundaries of the claims at issue, that person must know both when something is a differently versioned digital content element and when something is not a differently versioned digital content element. Stating examples of differently versioned digital content elements

Prolifiq Software Inc. v. Veeva Sys., No. C 13-03644 SI,
2014 U.S. Dist. LEXIS 108630, at *13-28 (N.D. Cal. Aug. 6, 2014)

GROUND 4

(routing logic circuit)

Ground 4 ('643)

- **Claims:** 1-15
- **Basis:** §112(b) indefiniteness
- **Claim Element:** “routing logic circuit”
- The term “routing logic circuit” is a ***coined phrase*** with no established meaning in the art
- But the specification never uses the term “routing logic circuit”
- Unclear whether (or to what extent) “routing logic circuit” is the same/different than “USB routing switch” in dependent claim 3
- The specification says the bridge may “negat[e] the need for switches and/or routing logic” ’643, 7:2-3

How Is “Routing Logic Circuit” Different From “Routing Switch”?

threads. This doctrine, which is ultimately based on the common sense notion *972 that different words or phrases used in separate claims are presumed to indicate that the claims have different meanings and scope, see *Comark*

Karlin Technology, Inc. v. Surgical Dynamics, Inc., 177 F. 3d 968, 971-72 (Fed. Cir. 1999)

Ground 4 ('643)

at 1332). The importance of the intrinsic evidence reaches its zenith in cases like this when the district court finds from the extrinsic evidence that the term lacks an ordinary meaning. When a term “has no ordinary and customary meaning,” it is a “coined term,” raising the question of “whether the intrinsic evidence provides objective boundaries to the scope of the term.” *Iridescent Networks, Inc. v.*

IQASR LLC v. Wendt Corp., 825 F. App'x 900, 904 (Fed. Cir. 2020)

“Routing Logic Circuit” is Not a Known Term of Art

329. The term “*routing logic circuit*” in independent claims 1, 5, and 10 is a coined term without a well-understood meaning to a POSITA. More specifically, it is a generic term, and a POSITA would not have understood the term to convey any specific type of circuit. “Circuit” does not convey any specific meaning in this context, because many different circuits are used in USB products. And appending the qualifier “routing logic” does nothing to clarify the type of circuit claimed, because *any* circuit routing USB signals would have some type of “logic” for doing so. For example, a USB hub has routing logic that routes a signal from a host to the enabled ports in the hub.

-011 EX1013 (Welch), ¶329

The Intrinsic Evidence Does Not Make “Routing Logic Circuit” Definite

- The claims (e.g., claim 3) only create more ambiguity by referring to a “USB routing switch” that performs the claimed function
- The '643 specification does not even use the term “routing logic *circuit*”
- The file history provides no description of “routing logic circuit” beyond the specification

GROUND 5
(signal detection circuit)
(means-plus-function)

Ground 5 ('643)

- **Claims:** 1-9
- **Basis:** §112(f) indefiniteness (means-plus-function with no structure)
- **Claim Element:** “signal detection circuit”
- The term “signal detection circuit” is subject to MPF treatment
- The claims are indefinite because the '643 specification provides no corresponding structure
 - Aptiv does not even try to identify any corresponding structure (-011 POR (Paper 25), 77-82)

The Board's Guidance in the Institution Decision

further action. *Id.* at 6:8–16. However, the '643 patent provides no discussion regarding the claimed signal detection, let alone identifying a particular circuit for performing such function. Accordingly, we note that the POSITA, having read the '643, would not have been apprised of the scope of the “signal detection circuit” as recited in independent claims 1, 5, and 10. *See* 37 C.F.R. § 42.204(b)(3).

-011 ID (Paper 12), 52

There is No “Strong” Presumption Against MPF Treatment

the strictures set forth in the statute. Henceforth, we will apply the presumption as we have done prior to *Lighting World*, without requiring any heightened evidentiary showing and expressly overrule the characterization of that presumption as “strong.” We also overrule the strict requirement of “a showing that the limitation essentially is devoid of anything that can be construed as structure.”

Williamson v. Citrix Online, LLC, 792 F.3d 1339, 1349 (Fed. Cir. 2015) (en banc)

The “signal detection circuit” Claims are Drafted in MPF Format

circuit” is a means-plus-function limitation. If the word “means” is substituted for “signal detection circuit” in claim 1, the means-plus-function format is apparent, as the clause would recite “[means] for receiving USB signals from the consumer USB device” and making “a determination ... that the consumer device is operating in a USB host mode ... [or] is operating in a USB device mode.” Claim 5 similarly recites the function of the means (“determining ... whether the second USB signals emanate from a second USB host”).

-011 Petition (Paper 1), 96

“Signal Detection Circuit” is a MPF Term

The Court finds that Limestone fails to identify sufficient structure in the claims to avoid the application of Section 112, ¶ 6. The Federal Circuit has expressly declined to hold that the term “circuit” is sufficient to avoid application of Section 112, ¶ 6. *Apex Inc. v. Raritan Computer, Inc.*, 325 F.3d 1364, 1373 (Fed. Cir. 2003) (“[W]e do not find it necessary to hold that the term ‘circuit’ by itself always connotes sufficient structure”). More recently, in *Williamson v. Citrix Online, LLC*, the Federal Circuit held that for a claim limitation expressed in functional language without using the word “means,” the presumption against application of Section 112, ¶ 6 can be overcome without showing that the limitation is “essentially [] devoid of anything that can be construed as structure.” 792 F.3d 1339, 1349 (Fed. Cir. 2015). Thus, the *Williamson* test does not require an absolute lack of structure to invoke Section 112, ¶ 6. *Id.* The presumption is overcome when the

Limestone Memory Sys. LLC v. Micron Tech., Inc. et al.,
No. 8:15-cv-00278, 37 (C.D. Cal., Sept. 11, 2019)

“Signal Detection Circuit” is a MPF Term

adaptive control circuit for determining which wireless communications networks are available at a given location and time, for accessing a selected wireless communication network, for communicating with said selected wireless communication network to determine on a real time basis the operating characteristics of the wireless communication network, and for generating the frequency

adaptive control circuit [This is a means plus function limitation. *The function is: 1. Determining which wireless communications networks are available at a given location and time. 2. Accessing a selected wireless communication network. 3. Communicating with said selected wireless communication network to determine on a real time basis the operating characteristics of the wireless*

MLR, LLC v. Kyocera Wireless Corp., No. 05-CV-0935-BAJB, 2006 WL 6143076, at *1, Ex. B (S.D. Cal. Oct. 27, 2006) (emphasis in original)

The Structure in the Specification Must be “Clearly Link[ed]” to the Function

A structure disclosed in the specification qualifies as a “corresponding structure” if the specification or the prosecution history “clearly links or associates that structure to the function recited in the claim.” *B. Braun Med., Inc. v.*

Noah Sys. Inc. v. Intuit Inc., 675 F.3d 1302, 1311 (Fed. Cir. 2012)

The '643 Specification Discloses No Relevant Structure

Here, the '643 patent fails to disclose *any structure whatsoever* for determining host/device status, much less link that structure to the “signal detection circuit” means-plus-function term. The '643 patent specification states: “In use, the Head Unit controls the switching device via the USB Bridge hardware or any other convenient means of control. The [Head Unit] software application may choose to enable, for example, a phone on any one of the consumer USB ports, by requesting, commanding or otherwise knowing the phone is required to be in USB Host mode and commanding the routing of the specific USB port the phone is attached to the USB Bridge.” EX1011, 6:23-30. At most, this language hints that a host/device determination was made, but falls far short of indicating what structure (if any)²⁰ performed the function. Welch, ¶338. Accordingly,

-011 Petition (Paper 1), 98

The Head Unit Software Provides No Structure

²⁰ To the extent Aptiv argues the specification identifies head unit software as performing the function, this fails as a matter of law. If “signal detection circuit” refers to software (contradicting the use of “circuit”), “the structure disclosed in the specification [must] be more than simply a general-purpose computer or microprocessor.” *Aristocrat Techs. Australia Pty Ltd. v. Int’l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008). The specification describes nothing specific

-011 Petition (Paper 1), 98

MPF Terms With No Corresponding Structure are Indefinite

Thus, logical, functional descriptions of a claim limitation are not a substitute for corresponding structure. Here, a POSITA would not understand the term “activation control circuit” and the remaining claim language to provide “a sufficiently definite meaning as the name for structure.” *Williamson*, 792 F.3d at 1349. The claim merely recites functions of activating, deactivating, and holding an input buffer active. Nothing suggests what types of logic circuits are used implement these functions. Thus, because the specification does not disclose the corresponding structure to perform the claimed functions, Section 112, ¶ 6 applies.

Limestone Memory Sys. LLC v. Micron Tech., Inc. et al., No. 8:15-cv-00278, 36-40 (C.D. Cal., Sept. 11, 2019)

The Claims Are Obvious Regardless of MPF Treatment

If the Board finds “signal detection circuit” is not a means-plus-function term, it would simply refer to any circuit that performs the claimed functions. This Petition applies that interpretation for purposes of prior art analysis. Similarly, if the Board finds the term is means-plus-function but there is a corresponding structure, this Petition assumes corresponding structure is merely a circuit that performs the functions of the claims, because the specification discloses no structure.

-011 Petition (Paper 1), 99

GROUND 6
(indefiniteness: USB routing
switch includes the signal
detection circuit)

Ground 6 ('643)

- **Claims:** 4, 9, 15
- **Basis:** §112(b) indefiniteness
- **Claim Element:** “the USB routing switch includes the signal detection circuit” (claim 4 and 9)
- **Claim Element:** “the USB routing switch determines whether the second USB signal emanates from a USB device” (claim 15)
- Neither the claims nor specification answer the following questions:
 - Does the claim mean “routing switch” and “signal detection circuit” are on one IC?
 - Or that the “switch” and “signal detection circuit” transistors must be intermingled?
 - Or that the switch transistors must also function as a “signal detection circuit”?

The '643 Patent Does Not Disclose a Switch “Includ[ing]” a Signal Detector

The specification provides no structural description of any “signal detection circuit,” let alone how a switch might include it or perform a detection function. The specification merely states “[t]he HU software application may choose to enable, for example, a phone or any one of the consumer USB ports, by requesting, commanding or *otherwise knowing the phone is required to be in USB Host mode*” EX1011, 6:23-30 (emphasis added). And the sparse structural

-011 Petition (Paper 1), 101

The '643 Patent Does Not Disclose a Switch “Includ[ing]” a Signal Detector

In use, the Head Unit controls the switching device via the USB Bridge hardware or any other convenient means of control. The HU software application may choose to enable, for example, a phone on any one of the consumer USB ports, by requesting, commanding or otherwise knowing the phone is required to be in USB Host mode and commanding the routing of the specific USB port the phone is attached to the USB Bridge. Once routed to the USB Bridge, the phone will

EX1011 ('643), 6:23-30

Dr. Houh Admission re “Detection Circuit”



121. The same applies to the “including” requirement; separate circuits are frequently combined with predictable results. For example, to perform analog-to-digital conversion, a microcontroller could interface with an analog to digital converter, or it may just as easily include an analog to digital converter circuit.

There is no reason to think that known detection circuits could not be included in a routing switch.

-228 EX2001 (Houh), ¶121

Dr. Houh Admission re “Detection Circuit”



116. Given that some claims require the routing switch to include the signal detection circuit whereas others do not, a POSITA would understand that the location of the signal detection circuit was a matter of design choice. Because of the functional relationship between the signal detection circuit and the routing switch, it would be natural to implement a routing switch that includes the signal detection circuit. The method of claims 4 and 9 could be performed with such a

EX2001 (Houh), ¶116

Dr. Houh Admission re “Detection Circuit”



system, assuming the other limitations were met. Alternatively, the signal detection circuit could be located elsewhere while still performing the claimed method of the independent claims. As a practical matter, it would be easy for a POSITA to implement either configuration in view of the '643 patent's disclosures and a POSITA's knowledge of the art.

EX2001 (Houh), ¶116

Dr. Houh Admission re “Detection Circuit”



120. Moreover, in the art of electrical engineering, circuits can be combined with predictable results. For example, because circuits behave predictably when combined, a POSITA could select a desired circuit from the class of signal detection circuits and expect it to work with a given routing switch.

Conversely, a variety of routing switches could be used to route the signals in accordance with a determination by a signal detection circuit.

-228 EX2001 (Houh), ¶120

GROUND 7
(written description: USB
routing switch includes the
signal detection circuit)

Ground 7 ('643)

- **Claims:** 4, 9, 15
- **Basis:** §112(a) lack of adequate written description
- **Claim Element:** “the USB routing switch includes the signal detection circuit” (claim 4 and 9)
- **Claim Element:** “the USB routing switch determines whether the second USB signal emanates from a USB device” (claim 15)
- The '643 specification:
 - (1) only sparsely describes the claimed “switch”;
 - (2) provides no structural description of “signal detection circuit”; and
 - (3) provides no description of the “switch” including the “signal detection circuit”

The Test for Written Description

invention, one can show possession. But the hallmark of written description is disclosure. Thus, “possession as shown in the disclosure” is a more complete formulation. Yet whatever the specific articulation, the test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art. Based on that inquiry, the specification must describe an invention understandable to that skilled artisan and show that the inventor actually invented the invention claimed.

Ariad Pharms., Inc. v. Eli Lilly & Co., 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc)

The Patent Specification

In use, the Head Unit controls the switching device via the USB Bridge hardware or any other convenient means of control. The HU software application may choose to enable, for example, a phone on any one of the consumer USB ports, by requesting, commanding or otherwise knowing the phone is required to be in USB Host mode and commanding the routing of the specific USB port the phone is attached to the USB Bridge. Once routed to the USB Bridge, the phone will

'643 (EX1011), 6:19-26

Patent Owner's Statement re Signal Detection Circuit

A POSITA would understand, based on the specification's disclosure and his or her general understanding of routing switches and signal detection circuits in the field of USB, that the inventors had possession of the claimed subject matter. (EX2001, ¶¶118-122.) The claims and specification explain that the function of

-011 POR (Paper 25), 88