

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROCHIP TECHNOLOGY INC.
Petitioner,

v.

APTIV TECHNOLOGIES AG
Patent Owner.

Patent No. 9,619,420

Inter Partes Review No. IPR2024-00495

PATENT OWNER'S PRELIMINARY RESPONSE

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Exhibit List for *Inter Partes* Review of U.S. Patent No. 9,619,420

Exhibit #	Exhibit Description
2001	Declaration of Henry Houh (“Houh Decl.”)
2002	Trial Transcript Excerpts, <i>Microchip Tech. Inc. v. Aptiv Servs. US, LLC</i> , No. 17-cv-1194 (D. Del. Apr. 6-13, 2022) – Testimony of Mitch Obolsky
2003	Trial Transcript Excerpts, <i>Microchip Tech. Inc. v. Aptiv Servs. US, LLC</i> , No. 17-cv-1194 (D. Del. Apr. 6-13, 2022) – Testimony of Robert Voto
2004	Complaint, <i>Aptiv Technologies Ltd. v. Microchip Technology, Inc.</i> , No. 23-cv-307-JDW (D. Del.)
2005	Trial Exhibit No. 58 - Jun. 18, 2014, Mark Orlosky and Brigham Steele Email Chain re: CarPlay and forced DCP to external ports
2006	Trial Exhibit No. 62 - Oct. 1, 2014, Stefan Saenger, Chris Behal, and Ray Kamps Email Chain re: CarPlay - Fiat
2007	Trial Exhibit No. 66 - Nov. 26-Dec. 1, 2014, David Sroka, Eric Kawamoto, and Sal Canu Email Chain re: Media Hub Interim Update
2008	Trial Exhibit No. 246 - Jul. 20, 2014, Don Perkins Email re: UNG Detroit Sales Meeting and Training July 15 – 18
2009	Trial Exhibit No. 252 - Aug. 11, 2014, David Sroka, Don Perkins, Sal Canu Email Chain re: CarPlay compliance Strategy
2010	Trial Exhibit No. 262 - Sal Canu Dec. 2, 2014, Email re: Microchip Position for the Thursday Chrysler Meeting
2011-2015	<i>Intentionally Omitted</i>
2016	Robert Dezmelyk Declaration in Support of Microchip’s Responsive Claim Construction Brief, <i>Aptiv Technologies AG v. Microchip Technology Inc.</i> , No. 23-cv-307-JDW (DED)
2017	Trial Transcript Excerpts, <i>Microchip Tech. Inc. v. Aptiv Servs. US, LLC</i> , No. 17-cv-1194 (D. Del. Apr. 6-13, 2022) – Testimony of Michael Dreon

IPR2024-00495

Exhibit #	Exhibit Description
2018	Redacted Version of Jury Verdict Form, <i>Microchip Tech. Inc. v. Aptiv Servs. US, LLC</i> , No. 17-cv-1194 (D. Del.), D.I. 357

Aptiv Technologies AG (“Aptiv” or “Patent Owner”) submits this Patent Owner’s Preliminary Response under 35 U.S.C. § 323 and 37 C.F.R. § 42.107 to Microchip Technology Inc. (“Microchip” or “Petitioner”)’s second Petition for *Inter Partes Review* of U.S. Patent No. 9,619,420 (“the ’420 Patent”).

I. INTRODUCTION

As an initial matter, the Board should exercise its discretion under 35 U.S.C. § 314(a) and decline to institute this second petition on the ’420 Patent. Instead of meeting its burden to offer “[a] succinct explanation of the differences between the petitions [and] why the issues addressed by the differences are material,”¹ Petitioner admits that “the Wave 2 claims [in this Petition] are all unpatentable over substantially the same art and arguments as the Wave 1 claims” in the first Petition against the ’420 Patent. (Pet., 24.) Because Petitioner has failed to justify the need for this second, second Petition, the Board should decline to expend its finite resources considering it.

Should the Board decide to reach the merits, it should deny the Petition as insufficiently supported. Petitioner provides no reason, other than attorney

¹ Office Trial Practice Guide Update (November 2019) (available at <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf?MURL=TrialPracticeGuideConsolidated>), 60 (hereinafter “CTPG”).

argument based on hindsight, why a person of ordinary skill in the art (“POSITA”) would be motivated to combine the two references on which it relies: U.S. Pub 2006/0206650 (“Chang”) and U.S. Pub. 2009/0268743 (“Chang II”). Three of Petitioner’s motivation-to-combine arguments fail to address the Chang II reference at all, rendering them legally insufficient. Petitioner’s fourth argument fares no better and relies on a passing, tangential reference as its sole support. Ultimately, Chang and Chang II, authored by different named inventors, are designed to address entirely different technical problems from one another and from the ’420 Patent. It was, in fact, precisely the limitations of systems like Chang and Chang II that the ’420 Patent was designed to resolve.

Petitioner’s own struggle to create a working solution to the problem solved by the ’420 Patent underscores precisely why such a solution was not obvious. The inventors of the ’420 Patent created their patented design in response to the pressing need for a USB hub capable of integrating into existing infotainment systems and providing support for Apple CarPlay, including Apple’s requirement that an iPhone act as the USB host. At the time of the invention, Petitioner was the market leader in vehicle USB hub chips and was highly motivated to develop a solution to the CarPlay problem in response to automakers’ repeated requests. Yet even years after learning of CarPlay, and even after learning of Aptiv’s solution,

Petitioner's own engineers repeatedly acknowledged that they had no way of providing what it was that the automakers required.

Because Chang and Chang II are directed to different problems, their combination also fails to address every limitation of the challenged claims. Most notably, neither reference teaches a system in which two USB hosts are able to engage in "bidirectional initiation of communication," as required by every independent claim of the '420 Patent. Because the Petition suffers from multiple glaring deficiencies, the Board should decline to institute *inter partes* review of the '420 Patent.

II. DISCRETIONARY DENIAL IS WARRANTED UNDER § 314(a)

Two months before filing the instant Petition, Petitioner filed IPR2024-00228 challenging claims 1-12 and 15-17 of the '420 Patent on the same grounds Petitioner now challenges claims 13, 14, and 18-20 of the '420 Patent in this Petition. *See Microchip Tech. Inc. v. Aptiv Techs. AG*, No. IPR2024-00228 (filed Dec. 27, 2023), Paper 1 (hereinafter "Wave 1 petition" or "first petition").

Because Petitioner has not sufficiently justified the need for two petitions against the '420 Patent, Aptiv submits that the Board should exercise its discretion to deny institution of the instant Petition under § 314(a). *Cuozzo Speed Techs., LLC v. Lee*, 579 U.S. 261, 273 (2016) ("[T]he agency's decision to deny a petition is a matter committed to the Patent Office's discretion.").

The Petition’s argument that the Board should not discretionarily deny institution of the Petition under § 314(a) fails to engage with the proper analysis and fails to consider relevant factors that support discretionary denial. (Pet., 90) Specifically, the Petition treats its *Sotera Wireless* stipulation regarding parallel district court proceedings² as dispositive, when “the § 314(a) inquiry is ‘a balanced assessment of all relevant circumstances in the case, including the merits.’” *See Oticon Med. AB v. Cochlear Ltd.*, IPR2019-00975, Paper 15, 22 (PTAB Oct. 16, 2019) (precedential as to § II.B-II.C) (quoting Office Trial Practice Guide Update (July 2019) (*available at* <https://www.uspto.gov/about-us/news-updates/consolidated-trial-practice-guide-november-2019>), 25)).³ (Pet., 90)

The Board’s balanced assessment includes, but is not limited to, the non-exclusive factors enumerated in *General Plastic Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19, 16–17 (PTAB Sept. 6, 2017) (precedential as to § II.B.4.i), as well as consideration of “the efficient administration of the Office,

² Petitioner stipulates that it “will not pursue invalidity of the Challenged Claims in a parallel district court proceeding on the same grounds or any grounds that could have reasonably been raised before the PTAB in this Petition.” (Pet., 90.)

³ The current (November 2019) edition of the Board’s Consolidated Trial Practice Guide contains the same language. (CTPG, 58.)

and the ability of the Office to timely complete proceedings.” (CTPG, 58 (quoting 35 U.S.C. § 316(b))). For example, the Board considers “whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition,” as well as “the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition” and “the finite resources of the Board.” (*Id.*, 57 (quoting *General Plastic*, Paper 19, 16).)

The Board has further instructed that “one petition should be sufficient to challenge the claims of a patent in most situations.” (CTPG, 59.) Because “multiple petitions by a petitioner are not necessary in the vast majority of cases,” a petitioner filing two or more petitions challenging the same patent should provide an “explanation of the differences between the petitions, why the issues addressed by the differences are material, and why the Board should exercise its discretion to institute” more than one petition. (CTPG, 59-60.)

Neither the Petition nor Petitioner’s Explanation for and Ranking of Two Petitions meet Petitioner’s burden to explain why it needed more than one petition to challenge the ’420 Patent. Rather than justifying the need for two petitions challenging the ’420 Patent, Petitioner’s articulated reason for filing a second petition only highlights why the Board should exercise its discretion to deny institution. Petitioner claims that Aptiv’s claim interpretations in parallel district

court litigation warranted filing this second (“Wave 2”) Petition challenging additional claims of the ’420 Patent. (Pet., 24.; *Microchip Tech. Inc. v. Aptiv Techs. AG*, No. IPR2024-00495 (filed Dec. Feb. 27, 2024), Paper 4 (hereinafter “Pet’r Ranking”), 4 (“Patent Owner’s belated disclosure of its proposed corrections to independent claims 13 and 18 necessitated filing an IPR petition on these claims.”) Neither the substance nor the timing of Aptiv’s claim interpretations justifies this second Petition.

First, Petitioner acknowledges that Aptiv’s claim interpretations did not introduce new invalidity arguments not presented in its Wave 1 petition. According to Petitioner, “[u]nder Aptiv’s claim interpretations, ***the Wave 2 claims are all unpatentable over substantially the same art and arguments as the Wave 1 claims.***” (Pet., 24 (emphasis added)). This concession undermines Petitioner’s assertion that the lack of “overlapping claims” across petitions establishes that “the petitions present materially different challenges.” (Pet’r Ranking, 1.) Petitioner expressly acknowledges that there is no material difference between the arguments in both petitions that would justify instituting both of them.

For example, the substance of Petitioner’s motivation-to-combine and secondary considerations discussions are nearly word-for-word identical⁴ across its parallel petitions challenging the ’420 Patent. (*Compare* Wave 1 Pet., IPR2024-00228, Paper 1, 33-45, *with* Pet., 36-48 (motivation to combine); *compare* Wave 1 Pet., IPR2024-00228, Paper 1, 83-85, *with*, Pet., 87-89 (secondary considerations).) Similarly, Petitioner’s Wave 1 arguments for claim 1 and Petitioner’s Wave 2 arguments for claim 13 are substantially the same. (*Compare* Wave 1 Pet., IPR2024-00228, Paper 1, 45-64, *with* Pet., 48-69.) As one example, Petitioner’s arguments for claim element 13[c] in this Petition paraphrase the same arguments made for claim element 1[g] in Petitioner’s Wave 1 petition. (*Compare* Wave 1 Pet., IPR2024-00228, Paper 1, 61-64, *with* Pet., 65-69.) This is not surprising: as can be seen below, Claim 13 is a method claim that recites operating

⁴ The motivation-to-combine discussion in this Petition makes two grammatical changes in footnote 11: (1) changes “control the switching functionality” to “control switching functionality” and (2) changes “the select lines of the switch” to “the switch’s select lines.” (*Compare* Wave 1 Pet., IPR2024-00228, Paper 1, 38 n.11, *with* Pet., 42 n.11.) Petitioner’s secondary-considerations discussion fixed typos in the Wave 1 petition that referred to the wrong patent. (*Compare* Wave 1 Pet., IPR2024-00228, Paper 1, 83-85, *with*, Pet., 87-89.)

the same arrangement of components recited in Claim 1⁵ (corresponding elements are noted with the same color and formatting).

'420 Patent, Claim 1	'420 Patent, Claim 13
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 <i>connect the second USB port to the first USB port through the USB bridge</i>, thereby providing bidirectional initiation of communication between the USB host and the consumer device <i>when the consumer device connected to the second USB port is in a USB host mode</i> and wherein the USB routing switch is configured to <u>connect the second USB port directly to the first USB port through the USB hub</u>, thereby only responding to	13. A method of operating a USB hub module having a USB hub configured to be interconnected to a first USB port connected to a USB host and a second USB port connected to a consumer device, 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, said method comprising the steps of: determining when the consumer device is operating in a USB host mode and in a USB device mode; <i>connecting the consumer device via the second USB port to the USB host via the first USB port through the USB routing switch and the USB bridge</i>, thereby providing bidirectional initiation of communication between the USB host and the consumer device <i>when the consumer device is determined to be in the USB host mode</i>; and <u>connecting the consumer device via the second USB port to the USB host via</u>

⁵ Because Petitioner's invalidity grounds rely on Aptiv's proposed constructions in district court, Aptiv reproduces the language of Claim 13 incorporating Aptiv's proposed constructions. (Pet., 27-28.)

communication initiated by the USB Host <u>when the consumer device connected to the second USB port is in a USB device mode.</u>	<u>the first USB port through the USB routing switch and the USB hub</u> thereby bypassing the USB bridge to only respond to communication initiated by the USB host <u>when the consumer device is determined to be in the USB device mode.</u>
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Similarly, Claim 18⁶ recites the same arrangement of components as Claim 1, but is directed to a communication system, rather than a USB hub module (corresponding elements are noted with the same color and formatting):

'420 Patent, Claim 1	'420 Patent, Claim 18
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;	18. A communication system, comprising: a USB hub interconnected to a first USB port and a second USB port; a central vehicle microcontroller connected to said first USB port; a first consumer device connected to said second USB port;

⁶ Aptiv is no longer asserting Claim 18 or its dependent claims in the parallel district court litigation, or seeking construction of any terms in those claims.

Because the Petition's invalidity grounds for Claim 18 rely on the constructions Aptiv previously proposed in the parallel district court litigation, however, Aptiv reproduces the language of Claim 18 incorporating those constructions. (Pet., 27-28.)

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 <i>when the consumer device connected to the second USB port is in a USB host mode</i> and wherein the USB routing switch is configured to <u>connect the second USB port directly to the first USB port through the USB hub</u>, thereby only responding to communication initiated by the USB Host <u>when the consumer device connected to the second USB port is in a USB device mode</u>.	a USB host-to-host bridge connected to said first USB port; a USB routing switch <i>providing a first communication path between said second USB port and said USB host-to-host bridge</i> and <u>a second communication path between said second USB port and said first USB port that bypasses said USB host-to-host bridge</u>, wherein <i>said USB routing switch connects said first communication path when the first consumer device is connected to said second USB port and is operating in a USB host mode</i>, thereby providing bidirectional initiation of communication between the USB host and the consumer device and wherein <u>said USB routing switch connects said second communication path, thereby only responding to communication initiated by the USB host when the first consumer device is connected to said second USB port and is operating in a USB device mode</u>.
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Second, the timing of Petitioner’s receipt of Aptiv’s claim interpretations also does not justify its parallel petitions. Petitioner had ample time after receiving Aptiv’s claim interpretations and before filing its first petition to apply its Wave 1 invalidity arguments to the claims challenged in this Petition and make any desired changes to those arguments. Petitioner acknowledges that it received Aptiv’s claim interpretations on November 8, 2023, seven weeks before Petitioner filed its Wave 1 petition challenging claims of the ’420 Patent. Seven weeks gave

Petitioner more than enough time to include its substantially similar Wave 1 and Wave 2 arguments in a single petition challenging all claims of the '420 Patent.⁷ Instead, Petitioner waited more than three months after receiving Aptiv's claim interpretations (and two months after its Wave 1 petitions were filed) to present near-duplicate arguments to the Board in this Petition.

Additionally, word-limit constraints provide no cognizable justification for these parallel petitions given the limited scope of Petitioner's invalidity challenges and the substantial similarity in Petitioner's Wave 1 and Wave 2 arguments. Petitioner has not requested that the Board engage in claim construction and there is no dispute regarding the prior art status of the two references underlying

⁷ Furthermore, Petitioner could have, but chose not to, take even more time to prepare its Wave 1 petitions to incorporate any response to Aptiv's claim interpretations and consolidate its challenges to the '420 Patent in a single petition. Indeed, 35 U.S.C. § 315(b) afforded Petitioner more than four months after receiving Aptiv's claim interpretations to prepare and file an IPR petition challenging the '420 Patent. Petitioner was served with Aptiv's district-court complaint asserting infringement of the '420 Patent against Petitioner on March 21, 2023. Summons at 2, *Aptiv Techs. Ltd. v. Microchip Tech., Inc.*, No. 23-cv-00307 (D. Del.) (ECF No. 5).

Petitioner's sole obviousness ground for each of the twenty challenged claims. And contrary to Petitioner's assertion, Petitioner's § 325(d) explanation (which occupies less than three pages of the 94-page Petition (Pet. 90-92)), also does not justify a second petition to exceed the word limit. (Pet'r Ranking, 2).

The number of challenged claims also does not necessitate multiple petitions. Twenty claims is not an inordinate number: applicable regulations specify that up to twenty claims are included in the basic filing fee for a petition. 37 C.F.R. § 42.15(a)(1), (3). Here, Petitioner's own statement regarding the substantial similarity between its Wave 1 and Wave 2 arguments and the substantial similarity between the underlying claims demonstrates that Petitioner could have brought the same invalidity arguments in a single petition challenging all twenty claims of the '420 Patent. (Pet., 24.)

Because Petitioner's petitions challenging the '420 Patent implicate the "fairness, timing, and efficiency concerns" that the Board seeks to address through discretionary denial, the Board should exercise its discretion to deny institution of this Petition under § 314(a). (CTPG 59.) Nevertheless, if the Board decides to reach the merits, this Petition's conspicuous deficiencies, as discussed below, also warrant denial.

III. BACKGROUND

A. Traditional USB Topology

Universal Serial Bus (“USB”) is a ubiquitous communication protocol that has been used in automobiles for some time. (EX-1003, 1:31-33; EX-2001, ¶ 30.) Among other things, it allows a car’s infotainment system to communicate with various devices in the vehicle, such as removable consumer devices (e.g., smartphones) and/or non-removable embedded devices (e.g., an SD card reader). (EX-1003, 1:50-58, 2:4-12.)

USB uses a strict top-down topology: a single upstream “host” manages and communicates with all downstream “devices.” (*Id.* at 1:36-44.) A USB network can have only one host, and the host must initiate all communication within the network—hosts are not configured to listen for or respond to incoming messages. (EX-2001, ¶ 33.) Downstream devices in a USB network merely respond to requests from a host. (*Id.*)

The downstream devices connect to the host via ports—physical connection interfaces. (*Id.*, ¶ 36.) USB networks may also include USB hubs—devices that increase the number of ports to which downstream devices may connect. (*Id.*) A standard USB hub routes multiple downstream ports to a single upstream port, allowing a host to have more downstream ports while reducing the amount of wiring required. (*Id.*)

B. Apple's CarPlay Requirements

In 2013, Apple announced its plans for “CarPlay,” a technology that would allow passengers to use iPhone applications via a vehicle’s infotainment system. (*Id.*, ¶ 39.) As part of its announcement, Apple provided automakers with certain technical requirements to ensure that CarPlay would function properly. (*Id.*) Apple described these requirements in an Accessory Interface Specification and mandated a certification process to ensure that only certified devices would be permitted to support CarPlay. (*Id.*)

Notably, CarPlay required that the iPhone act as the USB host at all times while CarPlay was in use. (*Id.*, ¶ 40.) This presented a quandary for automakers because most existing automobiles had USB networks designed to operate with a built-in USB host (i.e., the “head unit”) contained in the infotainment system. (*Id.*) In those existing systems, consumer devices such as smartphones, SD cards, etc. connected to the USB network through a hub and would appear to the head unit as USB devices. (*Id.*)

Apple’s requirement that the iPhone act as a USB host complicated this design because the iPhone and the head unit could not both be hosts under USB’s conventional top-down architecture. (EX-1003, 2:8-2:11; EX-2001, ¶ 40.) Existing infotainment system design would not allow the iPhone to act as a USB host for CarPlay while also allowing the head unit to control the other media

devices in the vehicle. (EX-2001, ¶ 40.) Nor would it allow the iPhone to communicate with the head unit while the iPhone acted as a host. (*Id.*) Even more challenging, certain non-CarPlay use cases expected the iPhone to function as a USB device. (EX-1003, 3:59-3:62.)

C. Existing Technology Fell Short

At the time of the patented invention, there were two methods for implementing host-to-host and host-to-device communication in an automotive USB system that would permit an iPhone to act as a host within a car's USB system. Both methods were flawed.

The first solution—a “dual-lane” approach—supported host-to-host communications and host-to-device communications on separate lines. Consequently, the system required an additional communication path between the car's head unit and every host-to-host port, adding significant cost and complexity to the USB system. (EX-2001, ¶ 42.) Moreover, the dual-lane approach required consumers to attach a smartphone using different ports depending on whether the phone was operating in host or device mode. (EX-1003, 3:39-3:48.)

The second solution was role reversal: a method of inverting the USB system to swap the existing host and device roles. (EX-1003, 3:49-3:52.) For example, specialized “On-the-Go” or “OTG” ports permitted OTG-capable devices to act as a host while CarPlay was active. (EX-1003, 3:49-3:52; EX-2001, ¶ 43.)

Similarly, Microchip’s proprietary “FlexConnect” feature dynamically changed a physical port from an upstream port to a downstream port, thereby allowing a device to swap from host to device and vice versa. (*Id.*)

But the role-reversal approach suffered from a fundamental and unacceptable flaw. Though it allowed the smartphone to act as a host, it forced the infotainment system to act as a device. (EX-1003, 3:60-3:64.) That meant that the infotainment system could not support other downstream devices during CarPlay, potentially interrupting features like navigation and audio playback. (EX-1003, 3:57-3:67.) Role-reversal could not simultaneously provide both host-to-host communication *and* persistent downstream USB connections throughout the vehicle. (EX-2001, ¶ 44.)

Even Microchip recognized that dual-lane and role-reversal solutions were simply not acceptable to its customers, conceding that, “[w]hen persistent USB is a requirement we definitely have run into a wall.” (EX-2007, 1.)

D. Manufacturers Demanded Better Solutions

Automakers, also known as Original Equipment Manufacturers (“OEMs”), wanted infotainment systems capable of CarPlay and persistent downstream USB communications, and they voiced this request to Microchip and other suppliers of USB hub modules. For example, Chrysler expressed that it “does not want to lose data capability on the other ports not tied to the Apple device.” (EX-2005, 2.) As

one of Microchip's employees noted, "[OEMs] want CarPlay AND they want additional connectivity to [*sic.*] head unit to other devices." (EX-2006, 2.)

E. Leading Chip Makers—including Microchip—Failed to Solve the Problem

At the time of the invention, Microchip was undisputedly an expert in chip design and manufacturing, including in the automotive USB sector. As of 2022, Microchip sold about eight billion chips per year and had at least 2,000 engineers working in its Networking and Data Center Business Unit, and many of those engineers specialized in research and development for new products. (EX-2002, 195:17-21, 199:5-9, 200:13-20, 203:22-204:3.) Between 2021 and 2022, Microchip provided 35 million USB hub chips per year to the automotive industry. (*Id.*, 211:8-14.)

In fact, prior to the invention, Microchip provided nearly 100% of all USB hub chips used in cars made by the "Big Three" automotive companies: Ford, Chrysler, and GM. (*Id.*, 211:23-212:6.) Microchip had also provided USB hub chips to Tesla, Audi, Volkswagen, BMW, Mercedes, Kia, Mazda, Toyota, Honda, and Nissan. (*Id.*, 215:1-23.)

If there were an obvious solution to manufacturers' demands, Microchip would have found it. Yet Microchip repeatedly acknowledged, both internally and to its customers, that it did not have a solution to the CarPlay problem even *years* after the 2013 priority date of the '420 Patent:

- On June 18, 2014, Microchip declared that the problem was not solvable:

Some items may be *physically outside the capabilities of ANY USB system*. . . . With USB, you are only allowed 1 Host and multiple devices on a bus. This message is critical, so we need to make sure [Chrysler] understands this fact *We need to emphasize that you cannot do CarPlay AND own the other ports with one USB data lane* No bus can serve two masters . . .

(EX-2005, 1-2 (emphases added⁸).)

- During an April 2022 trial,⁹ Microchip admitted that it told customers that the problem was not solvable:

⁸ All emphases added throughout unless otherwise specified.

⁹ Once Microchip eventually developed a competing product (modeled after Aptiv's), it sued Aptiv in Delaware district court, alleging that Aptiv's product infringed several of Microchip's existing USB patents. At trial, the jury disagreed, finding conclusively that Aptiv's product did not infringe any of the patents that Microchip asserted against it. (EX-2018.)

Q: So at this point in time, Microchip was telling its customers this one lane persistent USB thing isn't going to work and you should go with the FlexConnect solution instead?

A: That's about right.

(EX-2002, 312:4-9.)

- On July 20, 2014, Microchip acknowledged that Aptiv had invented a solution to the problem Microchip could not solve:

[Aptiv's] solution offers 'Flex' on every port and connectivity throughout the car. Both of these features are highly desirable by the car makers. . . . There is no way to defeat the competitive threat without accomplishing this.

(EX-2008, 1 (July 20, 2014).)

- Even after Aptiv invented a solution, Microchip continued to maintain that no viable solution was possible:

This is completely NON-STANDARD USB. . . . *This goes against the primary requirement of USB*; one bus / one Host. . . . These hosts will be acting independently of each other but will need to maintain USB specifications/ timing/time-outs/HID / adequate throughputs as if it was a single bus. Could be demo'd but *no way it can be guaranteed*.

(EX-2009, 1 (Aug. 11, 2014).)

- Even at the end of 2014, Microchip still had not been able to offer a system with persistent USB:

When persistent USB is a requirement *we definitely have run into a wall.*

(EX-2007, 1 (Dec. 1, 2014).)

F. Patent Owner Developed a Novel Solution That Provided Persistent USB

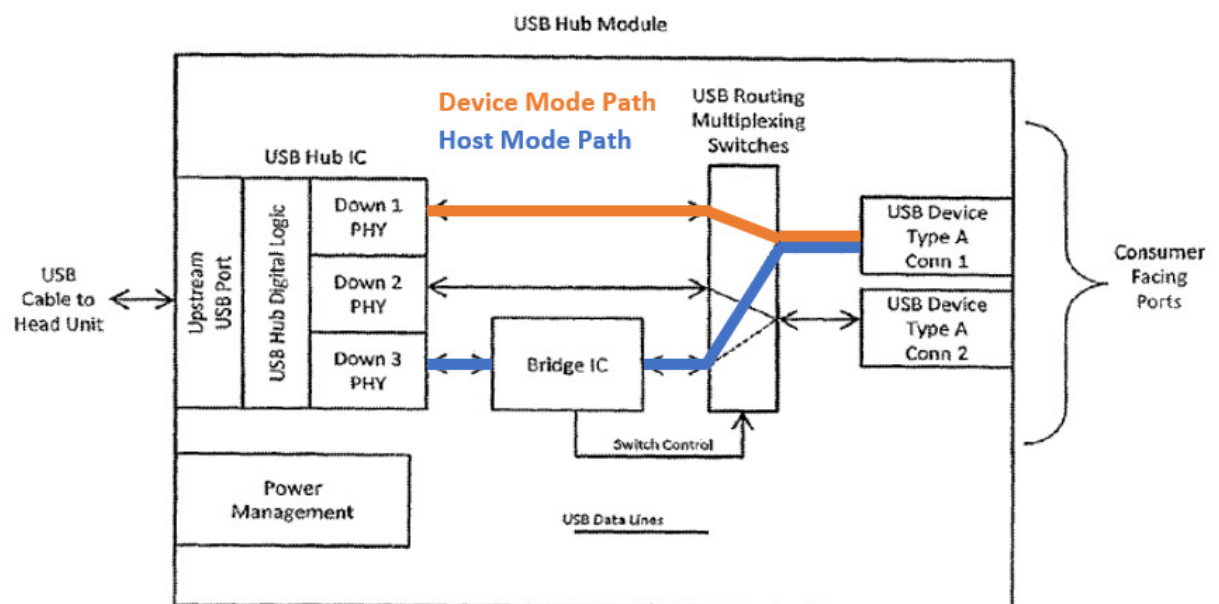
While Microchip, the market leader, considered this an impossible problem, Aptiv was able to create a single-upstream solution that supported CarPlay and allowed persistent downstream USB after launching a custom development program in late 2012.¹⁰ (EX-2003, 53:4-17, 54:16-55:1, 111:5-12.)

Aptiv's solution was creative and elegant, integrating a USB bridge into a traditional USB hub, allowing for host-to-host communication through the bridge without interrupting the traditional hub function for other downstream devices. (EX-1003, Claim 1, 4:20-22.) Specifically, when the consumer device is in host mode, the USB signal is routed to the hub through a USB bridge, rendering the two

¹⁰ At the time of the invention of the Asserted Patents, the inventors were employees of Unwired Technology, which was acquired by Aptiv (named Delphi at the time) in 2014.

hosts compatible. (*Id.*, Claim 1, 4:24-30.) But when the consumer device is in device mode, the USB signal is routed directly to the hub, thereby bypassing the bridge. (*Id.*, 4:22-24.) The alternative paths are shown below in an annotated version of Figure 4:

Figure 4



(*Id.*, Figure 4 (annotated).)

In contrast to the dual-lane approach, the patented invention can be implemented with a single upstream line and allows a CarPlay device to be connected on any port. This design also addresses the flaws in the role-reversal approach. Because it allows the infotainment system to remain a host at all times, even while supporting CarPlay, the design enables persistent communication with

downstream devices. (*Id.*, 8:59-9:4.) And it accomplishes this without the need for OTG ports or adapters; it takes an entirely different approach to solving the problem. (*See id.*, 1:19-24.)

G. As Patent Owner’s Invention Enjoyed Commercial Success, Microchip Failed to Replicate It

As a result of this innovative design, Aptiv’s dual-role hub product, which embodies the invention, is able to provide the features that auto makers found “highly desirable.” (EX-2008, 1.) As Microchip conceded, Aptiv’s solution “offers ‘Flex’” (i.e., host-to-host capability) “on every port and connectivity throughout the car” (i.e., persistent downstream USB). (*Id.*) As a result of Aptiv’s significant innovation, Aptiv unseated Microchip as the exclusive supplier of USB hub chips for the “big three” automotive companies. (EX-2002, 229:14-19, 237:22-238:8.)

If the invention were obvious over the prior art, as Microchip now contends, presumably, Microchip—an expert in the field—could have deduced how it works. This is especially true given Microchip’s resources and incentives to provide a viable CarPlay solution that would satisfy the automakers’ requirements. But even as Patent Owner’s invention gained traction in the market, Microchip still could not replicate it. As Microchip’s field application engineer explained on Dec. 2, 2014: “[w]e looked at developing a solution for 1 upstream lane, persistent USB data and we don’t have a solution. We wish we could provide a solution but we

don't have it.” (EX-2010, 1.) Thus, even with access to the prior art Microchip now relies on, Microchip's team of POSITAs and its motivated business unit could not develop the claimed invention.

H. Microchip Finally Released a Competing Product in 2017

Microchip finally launched a competing product in 2017, named “Sandia,” several years after the priority date, and multiple years after Aptiv released its product employing the patented technology. (EX-2004, ¶ 24.)

IV. PERSON OF ORDINARY SKILL IN THE ART (“POSITA”)

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. (EX-2001, ¶ 26.) Lack of work experience can be remedied by additional education, and vice versa. (*Id.*)

Petitioner's definition, heightened from its proposed definition of a POSITA in the co-pending district court litigation,¹¹ should be rejected.

¹¹ Petitioner's POSITA definition in these proceedings requires familiarity with a litany of specific documents and standards absent from Petitioner's POSITA definition in parallel district court litigation. (*Compare* Pet., 22-23, *with* EX-2016, ¶¶ 32-33.) Notably, Petitioner's expert in district court—a co-author of the

V. THE '420 PATENT

At a high level, the '420 Patent is generally directed to devices, systems, and methods for facilitating host-to-host and host-to-device communications through a USB hub. (EX-1003, Abstract.) Relevant to this proceeding, the '420 Patent contains claims directed to methods of operating a USB hub module (claims 13-14) and a communication system (claims 18-20).¹²

For purposes of this Petition, Claim 13 of the '420 Patent is generally representative, and recites:

13. A method of operating a USB hub module having a USB hub configured to be interconnected to a first USB port connected to a USB host and a second USB port connected to a consumer

original USB Specification—did not require familiarity with the particular documents and standards Petitioner now identifies, despite his broad consideration of “the type of problems encountered by practitioners, the nature of prior art solutions, [and] the rapidity of innovations in the area of USB technology[.]” (EX-2016, ¶¶ 32-33.)

¹² The Petition challenges only a subset of claims of the '420 Patent. Prior to filing the Petition in this case, however, Petitioner filed an additional 90-page IPR petition challenging claims 1-12 and 15-17 of the '420 Patent based on the same references presently asserted. *See Microchip Tech. Inc. v. Aptiv Techs. AG*, No. IPR2024-00228 (filed Dec. 27, 2023), Paper 1.

device, 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, said method comprising the steps of:

determining when the consumer device is operating in a USB host mode and in a USB device mode;

connecting the consumer device via the second USB port to the USB hub via the first USB port through the USB routing switch and the USB bridge, thereby providing bidirectional initiation of communication between the USB host and the consumer device when the consumer device is determined to be in the USB host mode; and

connecting the consumer device via the second USB port to the USB hub via the first USB port through the USB routing switch and the USB hub thereby bypassing the USB bridge to only respond to communication initiated by the USB host when the consumer device is determined to be in the USB device mode.

(EX-1003, Claim 13).

Thus, independent Claims 13 and 18 implement a USB routing switch (a) to connect a pair of USB ports through a USB bridge when a consumer device connected to one of the USB ports is in a USB host mode, and (b) to instead connect the pair of ports only through a USB hub when the consumer device is in a USB device mode.

VI. THE ASSERTED PRIOR ART REFERENCES

Petitioner relies on two prior art references. While both named inventors share the surname “Chang,” they are, in fact, different individuals:

- **Chang** – U.S. Pub 2006/0206650 (EX-1014) – Chang
discloses a hub for implementing host-to-host transmission

through a dedicated host port connected to a bridge. (*Id.*, Abstract, [0020].) Chang’s hub addresses the express goal of “easily establishing a connection between a computer and another computer.” (*Id.*, [0003].) Chang’s dedicated host port and bridge allow for host-to-host transmission between a first host device (such as a computer) connected to an uplink port and a second host device (such as another computer) connected to the dedicated host port. (*Id.*, [0020].) The Chang hub also comprises a number of downlink ports for linking devices connected to the downlink ports to Chang’s uplink port. (EX-1014, [0019].) The downlink ports allow for host-to-device transmission between devices connected to the downlink ports and a host device connected to the uplink port. (*Id.*, [0019].)

- **Chang II** – U.S. Pub. 2009/0268743 (EX-1015) – Chang II discloses a data transmission bridge device. (*Id.*, Abstract.) The Chang II bridge device has a first connection interface and a second connection interface connected by a control chip. (*Id.*, [0023].) Chang II’s control chip comprises a bypass circuit unit, a detection unit, a CPU, and a pair of USB

controllers. (*Id.*, [0013].) These components are arranged in a particular logical configuration to form two transmission paths between the pair of connection interfaces. (*Id.*, Figs. 1, 5, [0023].) The first connection interface is for connecting to a first host device, and the second connection interface is “for connecting to a second host device 3 **or** a slave device 4.” (*Id.*, [0022].) Chang II teaches that the second connection interface utilizes A-Type male connector design for connection to a host device, but that an adapter can be used to instead connect a slave device to the second connection interface. (*Id.*, [0029].) The control chip detects whether a host or slave device is connected to the second connection interface and selects one of the two transmission paths to enable data transmission between the first and second connection interfaces. (*Id.*, [0023].) The first transmission path is the “bridge transmission path,” which “spans first connection interface 11, first USB controller 131, buffer unit 136, second USB controller 132, and second connection interface 12.” (*Id.*) The control chip enables the bridge transmission path when a second host device connects to the

second connection interface and the control chip receives a response from the second host device that is responsive to an inquire signal produced by the control chip. (*Id.*, [0026].) The second path is the “bypass path,” which “spans first connection interface 11, first USB controller 131, bypass circuit 133, and second connection interface 12.” (*Id.*, [0023].) The bridge enables the bypass path when a user connects a slave device to the second connection interface and the control chip receives an inquire signal from the slave device. (*Id.*, [0027].)

VII. CLAIM CONSTRUCTION

For purposes of this Petition, Petitioner adopts Aptiv’s proposed constructions in parallel district court litigation. (Pet., 27.) At this time, Patent Owner sees no need for the Board to further construe any claim language because the Board need only construe terms that are in controversy. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368 (Fed. Cir. 2019). Patent Owner reserves the right to address any construction proposed hereafter by the Board or as relevant to arguments made in future submissions.

VIII. A POSITA WOULD NOT HAVE BEEN MOTIVATED TO COMBINE CHANG AND CHANG II

Petitioner’s sole ground challenges the claims of the ’420 Patent based on a combination of Chang, Chang II, and a POSITA’s knowledge.¹³ (*See* Pet., 4.) As such, Petitioner bears the burden to prove motivation to combine Chang and Chang II in the manner proposed. Instead of establishing a motivation to combine Chang and Chang II, however, Petitioner relies on the general existence of dual-role devices and its expert’s say-so as the foundation for its hindsight-based combination. This is insufficient to meet Petitioner’s burden to demonstrate “motivation to combine particular references,” *TQ Delta, LLC v. CISCO Systems, Inc.*, 942 F.3d 1352, 1360 (Fed. Cir. 2019), and to provide evidence “to support their use in the particular claimed combination,” *SmithKline Diagnostics, Inc. v. Helena Lab’ys Corp.*, 859 F.2d 878, 886-87 (Fed. Cir. 1988). Furthermore,

¹³ To the extent Petitioner contends that Chang II is not essential to Ground 1, the Petition does not articulate any single-reference obviousness ground based on Chang alone. Accordingly, the Board should decline to consider any argument that the ’420 Patent claims are invalid for obviousness based on Chang alone. *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1337 (Fed. Cir. 2020) (concluding that the Board erred by instituting *inter partes* review based on an obviousness combination not advanced in the petition).

Petitioner fails to demonstrate that its proposed Chang-Chang II combination meets each element of the challenged claims. Because each and every ground Petitioner raises involves combining Chang with Chang II, these failures warrant denying institution.

A. A POSITA Would Have No Reason to Consider Using Chang II to Modify Chang

Perhaps because there is none, Petitioner presents no evidence that a POSITA would be motivated to “modify Chang in view of Chang II and a POSITA’s knowledge to include dual-role port(s)” for use with dual-role devices. (Pet., 37.) Even assuming that a POSITA would have been motivated to modify Chang to include dual-role ports, a POSITA would not have looked to Chang II to accomplish that goal, and Petitioner presents no evidence to suggest otherwise. One need look no further than Chang II itself to confirm that a POSITA would have no reason to believe that Chang II would be compatible with Chang.

1. A POSITA would not have recognized Chang II as intended for use with dual-role devices

Nothing about Chang II suggests it is intended for use with dual-role devices. (EX-2001, ¶ 56.) As an initial matter, Chang II does not mention dual-role devices. It instead consistently and exclusively refers to *either* a “host device 3” or a separate and distinct “slave device 4” as the possible downstream device connected to the second connection interface, as shown in Figure 1 below:

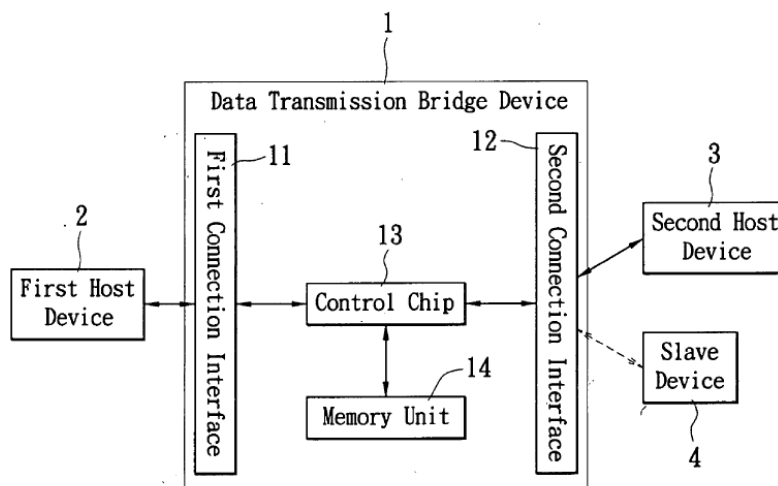


FIG. 1

(EX-1015, [0022], Fig. 1.) Chang II would therefore not have been a candidate for modifying Chang to add dual-role device connectivity. (EX-2001 ¶¶ 56-57.)

Petitioner’s sole argument that Chang II contemplates dual-role devices is Chang II’s disclosure that its second interface could use any of the connector types covered under the USB specification. (EX-1015, [0030].) This disclosure that a POSITA could use any specification-compliant connector type does nothing to suggest that any particular device type would be compatible with Chang II’s second connection interface—let alone suggest that Chang II would be useful for dual-role devices. (EX-2001, ¶ 58.) Petitioner’s *ipse dixit* assertion that a POSITA would have understood that “connecting dual-role products was within Chang II’s disclosure,” (Pet., 31 n.9 (relying on EX-1013, ¶ 157)) is supported only by “[c]onclusory expert testimony [and] does not qualify as substantial evidence.” *TQ*

Delta, 942 F.3d at 1358-59 (collecting cases). Notably, Petitioner does not contend that this would be sufficient to demonstrate motivation to combine Chang and Chang II. (Pet., 31 n.9.)

Petitioner’s suggestion that a POSITA would have read Chang II to disclose use of its bridge with dual-role devices based on the existence of Micro-AB connectors is hindsight-based revisionism. (Pet., 66.) Petitioner claims a POSITA would have understood Chang II to concern dual-role devices because a Micro-AB connector was “a well-known connector type” covered under the USB specification. (*Id.*; EX-1013, ¶ 157.) Chang II does not mention the Micro-AB connector, and its use contradicts Chang II’s actual descriptions regarding distinct host and slave devices and the need for an adapter to change device types. (EX-1015, [0029]; EX-2001, ¶ 58.) Furthermore, even if a POSITA would have considered Micro-AB connectors to be within the scope of Chang II’s disclosure, it would have been apparent that Micro-AB connectors would limit the utility of a USB hub like Chang’s by using an uncommon port that would have required an adapter to interface with most USB devices. (EX-2001 ¶ 59.) Notably, Petitioner does not propose using Micro-AB connectors in its combination of Chang and Chang II. Petitioner’s tenuous and conclusory evidence of a connection between Chang II and dual-role devices fails to establish that a POSITA would have modified Chang specifically in view of Chang II.

2. A POSITA would not have referenced Chang II to implement a dual-role port

The ports in the claimed invention are “dual-role” ports designed to accommodate a device regardless of whether it was operating in device or host mode. (EX-2001, ¶ 46.) Importantly, because the system was designed specifically to address the requirement that an iPhone act as a host when CarPlay is in use and as a device in other non-CarPlay use cases, these ports were designed to handle *the same device* swapping from host mode to device mode and vice-versa. (*Id.*)

Chang II does not consider a single device capable of operating in both host and device mode and instead expressly teaches that “an adapter 121 can be further attached to transform the connector type of the second connection interface 12.” (EX-1015, [0029]; EX-2001 ¶¶ 56-57.) This confirms that a POSITA seeking to modify Chang to incorporate dual-role ports would not reference Chang II. (EX-2001, ¶ 59.) Indeed, rather than contemplating a dual-role port that could accommodate a device regardless of whether it was in device or host mode, Chang II expressly discloses that the use of an adapter is necessary to swap between the USB connection used for USB hosts (A-type male) and the USB connection used for USB devices (B-type female): “if the second connection interface 12 needs to connect to a slave device 4 (which normally has a B-Type female connector of USB specification), *then an adapter 121 can be further* attached to transform the

connector type of the second connection interface 12, so that the required B-Type male connector of USB specification can be available.” (EX-1015, [0029].)

Chang II’s disclosure that its second interface could use any of the connector types covered under the USB specification does not obviate the need for an adapter to switch between different USB specification connector types at a given port. (*Id.*, [0030]; EX-2001, ¶ 59.) It is the adapter that permits the second connection interface to “acquire” a different USB specification connection type than the one it had “adopt[ed].” (EX-2001, ¶ 59.) Thus, Chang II does not contemplate the use of a port that would allow a single device to seamlessly swap between host and device modes, as taught in the ’420 Patent. (EX-2001, ¶¶ 57-58.)

3. A POSITA would not have been motivated to modify Chang with Chang II because adding steps to Chang’s solution would only frustrate Chang’s express goal

Additionally, Chang already accommodated both USB hosts and USB devices through dedicated ports for host-to-host and host-to-device transmission. (EX-1014, [0019]-[0020], Fig. 3; EX-2001, ¶¶ 62-63.) The very references Petitioner relies on therefore establish that a POSITA would have no motivation to look to Chang II (which does not mention dual-role devices, let alone dual-role ports) when searching for a disclosure pertinent to incorporating dual-role ports into Chang’s invention (which already accommodated dual-role devices). (EX-2001, ¶¶ 55-63.)

A POSITA would not have considered using Chang II to modify Chang for the additional reason that adding steps and components to Chang, as Petitioner proposes, would only have complicated Chang’s design and frustrated Chang’s “express goal” of “easily establishing a connection between a computer and another computer.” (*Id.*, ¶ 67; EX-1014, [0003].) Indeed, Chang II presents a specific method of connecting two devices using a bridge device that is substantially more complex than Chang’s generic bridge. (EX-2001, ¶¶ 67-68.) Chang II’s bridge includes a control chip with a CPU, a detection unit, multiple controllers, a bypass unit, and a buffer unit, as well as a memory unit and two connection interfaces, all arranged in a particular logical configuration. (*See* EX-1015, Figs. 1, 5; EX-2001, ¶ 67.) All of this would have been superfluous to Chang’s bridge, which provides simple host-to-host data transmission. (*See* EX-1014, [0020]; EX-2001, ¶ 67.)

Ignoring the fundamental differences in bridge design between Chang and Chang II, and with the benefit of hindsight, Petitioner cherry-picks only a portion of Chang II’s bridge (the detection unit) as the sole component from Chang II that Petitioner proposes should be added to Chang. (*See* Pet., 41-42 & n.11.) According to Petitioner, Chang II’s detection unit, *by itself*, would motivate a POSITA to route signals using a switch. (*See id.*, 41-42.) Despite acknowledging that Chang II’s bridge “includes ‘control chip 13’ (shown in Fig. 5) with ‘detection

unit' (134) and CPU (135),” (*Id.* at 42 n.11 (citing EX-1015, [0022]-[0023], [0034])), Petitioner plucks just the detection unit out of Chang II’s bridge and uses it to modify Chang (*see* Pet., 41-42 & n.11). Petitioner is forced to single out Chang II’s detection unit to modify Chang because using Chang II’s bridge in its entirety would result in a failure of Petitioner’s solution to meet each element of all challenged claims. That is because the claims require (1) a USB routing switch configured to connect the second USB port to the first USB port through the USB bridge when the consumer device is in a USB host mode and (2) a USB routing switch configured to connect the second USB port to the first USB port directly through the USB hub when the consumer device is in a USB device mode, such that the communication path bypasses the bridge when the consumer device is operating in a USB device mode (*e.g.*, “to dynamically switch the device connection between USB Device mode and USB Host mode when desired,” *see* EX-1003, 4:20-22). (*See* EX-2001, ¶ 68.) But Chang II lacks any disclosure suggesting that its detection unit would be extractable from the control chip of its bridge for use as a separate component. (*See, e.g.*, EX-1015, Fig. 5 & [0034]; EX-2001, ¶ 68.)

B. Petitioner’s Justifications for Combining Chang and Chang II Ignore and Mischaracterize Chang II’s Disclosures

Petitioner offers four alleged justifications for combining Chang and Chang II. (Pet., 36-37; *see also* EX-1013, ¶¶ 175-181 (Petitioner’s expert

declaration enumerating the four reasons).) None is persuasive or carries Petitioner’s burden to provide evidence of a motivation to combine at this stage. Petitioner’s first three arguments fail to discuss Chang II’s disclosures at all and therefore cannot provide a motivation to combine Chang II with any reference or disclosure. (Pet., 36-38.) Petitioner’s fourth argument transforms Chang II’s passing mention that its bridge *sometimes* functions similarly to a USB hub into an unfounded conclusion that “Chang II expressly states its relevance to USB hubs,” such that a POSITA would use Chang II to modify Chang. (*Id.*, 41; EX-1015, [0027], [0040].) Notably, none of Petitioner’s arguments address why a POSITA would have looked to Chang II’s specific disclosures to modify Chang.

1. Petitioner cannot establish obviousness over Chang and Chang II based on arguments that do not mention the teachings in Chang II

Petitioner’s first three motivation-to-combine arguments fail to mention Chang II’s teachings at all and therefore fail as a matter of law. *Innogenetics, N.V. v. Abbott Laby’s*, 512 F.3d 1363, 1373 (Fed. Cir. 2008) (“[K]nowledge of a problem and motivation to solve it are entirely different from motivation to combine particular references.”). First, Petitioner asserts that a POSITA would apply Chang II’s invention to USB hubs because Petitioner argues that products “with dual-role USB capabilities were gaining popularity.” (Pet., 37; EX-1013, ¶ 176.) Second, relying on its expert’s say-so, Petitioner asserts “common sense”

would motivate a POSITA to modify Chang to include dual-role ports because:

(1) “it would be impractical, and inconvenient at best, to require consumers to understand when to switch connections between dedicated host- and device-ports when using a dual role product”; and (2) including dual-role ports would save costs. (Pet., 37). Third, Petitioner argues that adding dual-role ports to Chang would “further its express goal of ‘easily establishing a connection between a computer and another computer.’” (*Id.*, 38 (quoting EX-1014, [0003])). None of these arguments refers to any teaching in Chang II, (*Id.*, 37-38) let alone “explain[s] why a person of ordinary skill in the art would have combined elements from specific references *in the way the claimed invention does.*” *TQ Delta*, 942 F.3d at 1360 (quoting *Innogenetics*, 512 F.3d at 1328). As such, none of these arguments suffices to establish motivation to modify Chang in view of Chang II.

2. Petitioner cannot establish obviousness based on combinations that fail to include all claim elements

Petitioner’s first argument further suffers from a failure of proof. Petitioner asserts that it would be obvious to modify Chang to not only incorporate dual-role ports, but also to “include a switch to route each port to the appropriate transmission path.” (EX-1013, ¶ 175.) To be sure, a switch is required by each claim of the ’420 Patent. (EX-1003, Independent Claims 1, 7, 13, 15, and 18 each reciting a “USB routing switch.”) Petitioner fails, however, to point to any disclosure in either Chang or Chang II as disclosing this element. Nor could it.

Chang, which Petitioner acknowledges uses dedicated ports, does not use or contemplate using a routing switch. (Pet., 36-37; EX-2001, ¶ 87; EX-1014, [0020].) Purely as a conceptual matter, Chang II contemplates switching between transmission paths, but does not actually disclose a discrete switch that performs this switching. (EX-2001, ¶ 61.) A POSITA would understand that switching between transmission paths could be performed by an element other than a routing switch. (EX-2001, ¶¶ 60-61.) Petitioner has thus failed to specify “where each element of the claim is found in the prior art.” *See* 37 C.F.R. 42.104(b)(4).

3. “Common-sense” cannot fill the gaps in Petitioner’s motivation-to-combine arguments

Petitioner’s second argument, based on “common-sense,” fails for the additional reason that common-sense rationalization alone is legally insufficient to supply a motivation to combine Chang and Chang II. *See In re Nuvasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (“[T]he PTAB cannot rely solely on common knowledge or common sense to support its findings” (citing *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016))).

Even if Petitioner’s “common-sense” arguments were legally cognizable, they suffer from a failure of proof. For example, Petitioner’s expert relies on the purportedly common-sense cost savings of dual-role ports, but provides no evidentiary support. Nor does Petitioner’s expert compare the costs associated with Chang’s solution to the costs associated with Petitioner’s allegedly obvious

modification of Chang. That failure is fatal to Petitioner's cost-savings argument, because cost savings are relative and can only be evaluated based on a comparison of the two competing solutions. (EX-2001, ¶ 65.) Petitioner's failure is especially problematic here, given that Petitioner's proposed modifications to Chang would only *add* components to Chang's existing USB hub, including components like the detection unit that Petitioner borrows from Chang II. (*See* Pet., 41-42; *see also* EX-2001, ¶ 65.)

Regardless, Petitioner's assertion of common-sense motivation to combine is rebutted by its own actions. In short, Petitioner's theory is premised on various shortcomings of then-existing USB systems, such as their reliance on designated host-to-host ports, costly additional components, and lack of persistent downstream USB. OEMs expressed similar concerns about existing solutions, including Petitioner's own products. (EX-2005; EX-2006; EX-2007.) If it was common sense to combine Chang and Chang II to address these issues, one might wonder why Petitioner did not do so. (EX-2010, 1 ("We looked at developing a solution for 1 upstream lane, persistent USB data and we don't have a solution. We wish we could provide a solution but we don't have it.").)

4. Petitioner cannot establish motivation to combine based on arguments that misapply the disclosures in Chang and Chang II

Petitioner’s third argument—that a POSITA would have been motivated to add dual-role ports to Chang to further Chang’s “express goal” of “easily establishing a connection between a computer and another computer”—also suffers from a failure of proof. (*See* Pet., 38). As an initial matter, the argument makes little sense: Chang already provides a way to accomplish its “express goal” and it does so using dedicated ports for host-to-host and host-to-device communication. (EX-1014, [0020]; EX-2001, ¶¶ 62-63.) Complicating Chang’s solution by adding steps and components, as Petitioner proposes, would only have frustrated Chang’s “express goal.” (EX-2001, ¶ 67.) Nothing in Chang calls for Chang II’s solution, and Petitioner presents no evidence suggesting otherwise. (*See* Pet., 38; EX-1013, ¶ 178.)

5. Petitioner’s final argument lacks sufficient evidentiary support

Petitioner’s fourth argument is lacking in evidentiary support. The Petition overstates Chang II’s passing mentions of a USB hub as a suggestion that Chang II’s bridge would be considered for improving Chang’s solution, which involved a hub and a bridge. (Pet., 41.) But Chang II does not suggest it could be used with a hub. (EX-2001, ¶¶ 70-71.) Instead, the cited paragraphs of Chang II note merely that when using its “bypass path,” the “data transmission bridge

device” provides an “intermediate transmission function (similar to the commonly known USB HUB function),” *i.e.*, “host-slave operation.” (EX-1015, [0027]; *see also id.*, [0040] (same).) As a POSITA would have recognized, this has nothing to do with the primary function and defining characteristic of a USB hub—allowing an upstream port to connect to multiple downstream ports. (EX-2001, ¶ 72; *see also* Pet., 6-7 (defining USB hubs in this way).) Rather, it is intended to convey that the bypass path is a passive intermediary and does not interrupt or transform the connection between the USB device and host. (EX-2001, ¶ 72.)

A POSITA need not look beyond Chang and Chang II to recognize that Chang II’s disclosures could not readily be combined with Chang to solve the problem presented by CarPlay and similar functionality. Petitioner’s arguments to the contrary are insufficient as a matter of law, suffer from a failure of proof, and are belied by Petitioner’s own actions, and therefore fail to provide competent evidence of motivation to combine Chang and Chang II. Accordingly, the Petition fails to demonstrate that there is a reasonable likelihood that at least one of the challenged claims is unpatentable.

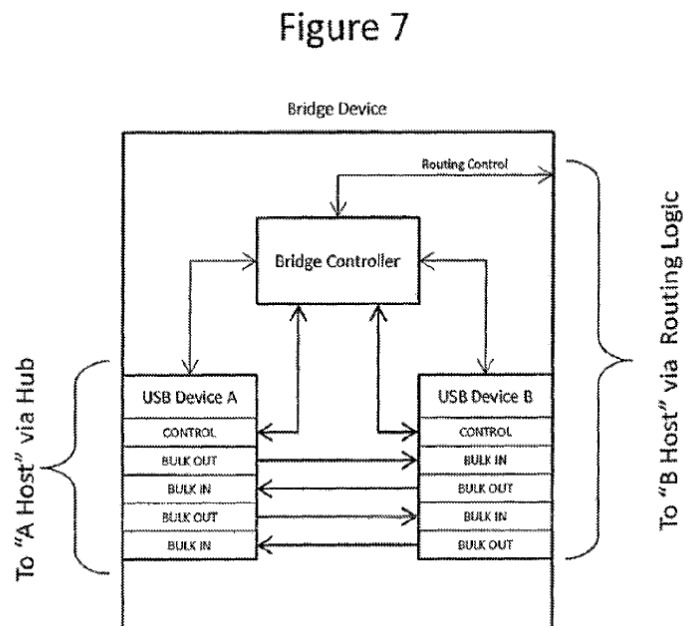
IX. PETITIONER FAILS TO PROVE THAT THE PROPOSED COMBINATION DISCLOSES EACH CLAIM ELEMENT

Each claim of the ’420 Patent requires a specific relationship between the USB bridge and the USB routing switch. When the routing switch is “configured to connect the second USB port to the first USB port through the USB bridge”

(because “the consumer device connected to the second USB port is in a USB host mode”), the switch and bridge must provide “bidirectional initiation of communication between the USB host and the consumer device.” (EX-1003, 9:19-25 (claim 1); *see also id.*, 9:66-10:5, 10:49-55, 11:7-14, 12:17-27 (other independent claims).)

Rather than engaging with this limitation, Petitioner merely waves its hands at it and identifies no evidence that it would have been part of the Chang-Chang II combination. The claim element is not trivial and stems from the need for a CarPlay-enabled iPhone and a vehicle’s embedded USB host to ***both*** be able to send, receive, recognize, and respond to requests between one another in order to implement CarPlay. (EX-2001 ¶ 89.) This contrasts with the standard USB architecture in which there is only a single USB host and only that USB host is able to send requests. (*Id.*, ¶ 33.) In such a network, USB devices (and only USB devices) are able to receive and respond to commands from the USB host and cannot communicate independently. (*Id.*) In the claimed system, it is not enough for a connected device to operate in host mode at the same time as the embedded host, it must be able to perform the functions of both a USB host (sending requests) and a USB device (receiving, recognizing, and responding to requests). (*Id.*, ¶ 87.)

The '420 Patent's specification contains a detailed description of how the bridge allows two hosts to initiate communication while each remains in host mode. For example, Figure 7 of the patent shows an exemplary embodiment of the bridge:



(EX-1003, Fig. 7.) As shown above, “the IN endpoints of Device A are connected to the OUT endpoints of Device B and the OUT endpoints of Device A are connected to the IN endpoints of Device B.”¹⁴ (*Id.*, 7:29-32.) These mappings of

¹⁴ To be clear, the “Device A” and “Device B” the patent describes here are not the host devices connected through the bridge, but rather components of the bridge itself that interface with those host devices. (EX-2001, ¶¶ 87-88.)

IN and OUT endpoints form “a bidirectional bridge that passes USB traffic between two USB Hosts.” (*Id.*, 7:54-60.) In addition, both devices “provide a bidirectional Control endpoint connected to their respective USB Hosts” to support “USB defined control messages between the Host and Device.” (*Id.*, 7:61-66.) “[T]he Control endpoints are mapped to the Bridge Controller,” which oversees and facilitates an enumeration process that allows “the two hosts . . . to use the IN and OUT endpoints to transfer application data and services.” (*Id.*, 8:2-38.)

While not every aspect of this exemplary mechanism is claimed, it illustrates that “bidirectional initiation of communication” entails more than just an electrical connection provided by configuring a switch. (EX-2001, ¶¶ 88-89.) A POSITA would have understood from the patent’s disclosures that bidirectional initiation of communication requires that both hosts send, receive, recognize, and respond to requests. (EX-2001, ¶ 89.) Notwithstanding this requirement, all that Petitioner attempts to show in its proposed combination is a “host-to-host connection” where “each host . . . may initiate communication *requests*.” (*See* Pet., 63-64.) As explained above, initiating communication *requests* is only a part of the communication that the claims require be initiated bidirectionally. The Petition is therefore facially insufficient.

Petitioner is also incorrect with respect to initiating communication requests. It cites three pieces of evidence, but none of these suggests that each host can

initiate requests, let alone communication (entailing not just sending of requests by one host, but also receipt, recognition, and responses by the other host). First, Petitioner cites to a background reference's statement that "one of the units operates as a USB Host which initiates communication requests . . . and the other operates as a USB Device which responds to those requests." (*See* Pet., 63-64 (quoting EX-1025, 1:17-20).) This statement plainly describes sending requests in only one direction. Next, Petitioner cites Chang's description of a "host-to-host transmission path." (*Id.* (citing EX-1014, [0020]).) But Petitioner fails to show why this would necessarily imply that *both* hosts are sending requests, when just one host sending commands to a second host, without the latter sending commands back, would still be "host-to-host transmission." (EX-2001, ¶ 91.) After all, Chang's USB hub is not a symmetric device, but rather one that privileges the host connected to the uplink port over a host connected to the host port, which is one of many downlink ports. (*See* EX-1014, [0019]-[0020], Figs. 3-4.) Lastly, Petitioner points to Chang II's description of how its bridge device connects two host devices. (Pet., 64 (citing EX-1015, [0026]).) The cited paragraph, however, states only that if the second host device responds to an inquire signal produced by the bridge's control chip, the chip will enable the bridge transmission path and thus "complete the bridging" between the host devices. (EX-1015, [0026].) This has

nothing to do with whether or how each of the devices could initiate communication. (EX-2001, ¶ 95.)

Confusingly, Petitioner appears to interpret “initiation of communication” in a second way that contradicts its assumption that initiation of communication is equivalent to initiating requests: Petitioner argues that enumeration (the activity that identifies and assigns unique addresses to devices attached to a bus) is also initiation of communication. (*See* Pet., 64-65.) Petitioner then uses this interpretation to argue that Chang II’s description of “complet[ing] the bridging” discloses “bidirectional initiation of communication” because a POSITA would have read it to mean “enumerating a device interface in the bridge.” (*Id.*, 65.) This argument is just as incorrect as the previous, and equally unsupported. As an initial matter, Petitioner offers only its expert’s conclusory say-so to justify its claim that “comple[ting] the bridging” means enumeration. (*See id.* (citing EX-1013, ¶ 244).) There is no evidence that a POSITA would have read Chang II in this way. If anything, context shows that “complete the bridging” simply means that on recognizing that the second device is a host device, Chang II’s bridge control chip will “switch the transmission path to the bridge transmission path,” enabling an electrical pathway that would otherwise be incomplete. (EX-1015, [0026]; EX-2001, ¶ 92.) Chang II says nothing about identifying devices or assigning addresses. At most, the control chip detects whether the attached device

is a USB host or a USB device. (EX-2001, ¶ 95.) Moreover, the alleged enumeration in Chang II occurs in only one direction, with only one of the two hosts responding to the inquire signal. (*Id.*; EX-1015, [0026].) Petitioner therefore cannot rely on it to show “bidirectional initiation of communication.”

In short, Petitioner fails to produce evidence that Chang, modified as proposed, would include a bridge that enables “bidirectional initiation of communication” as claimed.

X. CONCLUSION

Petitioner has failed to justify a need for the Board to expend its limited resources considering this parallel Petition when Petitioner raised substantially the same invalidity arguments to challenge other claims of the ’420 Patent in a first petition two months earlier. Accordingly, Aptiv respectfully requests that the Board exercise its discretion and decline to institute the Petition under § 314(a).

On the merits, Petitioner has failed to establish any motivation to combine the references on which it relies. Three of its arguments for why Chang and Chang II should be combined fail to address Chang II in any way and are therefore legally insufficient. Petitioner’s fourth argument lacks sufficient evidentiary support, relying instead on tangential mentions of “USB hubs” in the Chang II specification. Because the basis for each challenged claim relies on the

combination of Chang and Chang II, the failure to show a motivation to combine these references is fatal to the Petition.

Petitioner has also failed to sufficiently address each element of the challenged claims of the '420 Patent. Each independent claim of the '420 Patent requires “bidirectional initiation of communication” between two hosts when the consumer device is operating in USB host mode. Petitioner provides no evidence that this was contemplated, much less taught in any of its cited references.

Because Petitioner has provided no justification for why a POSITA would be motivated to combine the cited references and because Petitioner’s proposed combination fails to meet each element of the challenged claims of the '420 Patent, Aptiv respectfully requests that the Board deny institution of the Petition for *inter partes* review of the '420 Patent.

IPR2024-00495

Dated: June 6, 2024

Respectfully submitted,

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Certification of Word Count (37 C.F.R. § 42.24)

I hereby certify that this PATENT OWNER'S PRELIMINARY RESPONSE has 10,557 words (as counted by the “Word Count” feature of the Microsoft Word™ word-processing system), exclusive of “a table of contents, a table of authorities, mandatory notices under § 42.8, a certificate of service or word count, or appendix of exhibits or claim listing.”

Dated: June 6, 2024

By /s/ Alex S. Yap

Alex S. Yap

Certificate of Service (37 C.F.R. § 42.6(e)(4))

I hereby certify that the attached PATENT OWNER'S PRELIMINARY RESPONSE was served as of the below date via email (by agreement) to the following counsel of record for the Petitioner:

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