

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROCHIP TECHNOLOGY INC.,
Petitioner,

v.

APTIV TECHNOLOGIES AG,
Patent Owner

IPR2024-00495
Patent No. 9,619,420

APTIV TECHNOLOGIES AG'S NOTICE OF APPEAL

via P-TACTS
Patent Trial and Appeal Board

via Email
Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
efileSO@uspto.gov

via CM/ECF
United States Court of Appeals for the Federal Circuit

INTRODUCTION

Aptiv Technologies AG’s (“Aptiv”) appeal stems from the Patent Trial and Appeal Board’s Final Written Decision (Paper 51) (the “Final Written Decision”), entered on August 18, 2025, in the above-captioned *inter partes* review of United States Patent No. 9,619,420 (“the ’420 patent”). This notice is timely filed within 63 days of the Final Written Decision. 37 C.F.R. §§ 90.3(a)(1).

Aptiv requested Director Review of the Final Written Decision, but Aptiv withdrew its request on September 24, 2025, thus resolving the request (Exhibit 3101). This notice also is filed within 63 days of when the Director Review request was resolved. 37 C.F.R. §§ 90.3(a)(1), 42.75(e)(3).

APTIV TECHNOLOGIES AG’S APPEAL

Please take notice that—under 35 U.S.C. §§ 141(c), 142, 319; 37 C.F.R. §§ 90.2(a), 90.3(a), 42.75(e)(3); and Federal Rule of Appellate Procedure/Federal Circuit Rule 15—Aptiv hereby appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision and all underlying decisions and orders in this action on which that decision is based

APTIV TECHNOLOGIES AG’S ISSUES ON APPEAL

Aptiv’s issues on appeal include at least (37 C.F.R. § 90.2(a)(3)(ii)):

(1) the Board’s conclusion that challenged claims 13 and 14 of the ’420 patent had been proven unpatentable;

(2) any findings, analysis, or determinations supporting or related to that issue, including but not limited to (a) the Board's analysis of the Petition and prior art, and its determination that the Petition set forth, with particularity and adequate evidentiary support, an operable combination that met the requirements of claims 13 and 14; (b) the Board's analysis and determinations of motivation and reasonable expectation of success; and (c) the Board's analysis of nexus and secondary considerations of non-obviousness, and its decision not to apply the presumption of nexus; and

(3) all other issues decided adversely to Aptiv in any orders, decisions, rulings, or opinions in this action.

Simultaneously with this submission, Aptiv is filing a true and correct copy of this Notice of Appeal with the Director of the United States Patent and Trademark Office and a true and correct copy (or copies) of the same, along with the required filing fee, with the Clerk of the United States Court of Appeals for the Federal Circuit as set forth in the accompanying Certificate of Filing.

IPR2024-00495

Dated: October 17, 2025

Respectfully submitted,

By: /s/ Alex S. Yap

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CERTIFICATE OF FILING

The undersigned hereby certifies that, in addition to being electronically filed through P-TACTS, a true and correct copy of the above APTIV TECHNOLOGIES AG'S NOTICE OF APPEAL is being filed via email with the Director on October 17, 2025, at efileSO@uspto.gov, the email address indicated on the United States Patent and Trademark Office's web page for the Office of the General Counsel.

The undersigned also hereby certifies that a true and correct copy (or copies) of the above APTIV TECHNOLOGIES AG'S NOTICE OF APPEAL and the filing fee is being filed via CM/ECF with the Clerk's Office of the United States Court of Appeals for the Federal Circuit on October 17, 2025.

Dated: October 17, 2025

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that on October 17, 2025, the above APTIV TECHNOLOGIES AG'S NOTICE OF APPEAL was served in its entirety via electronic mail on the following:

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NON-PUBLIC VERSION—PROTECTIVE ORDER MATERIAL

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROCHIP TECHNOLOGY INC.,
Petitioner,

v.

APTIV TECHNOLOGIES AG,
Patent Owner.

IPR2024-00495
Patent 9,619,420 B2

Before JEAN R. HOMERE, TERRENCE W. McMILLIN, and
JOHN D. HAMANN, *Administrative Patent Judges*.

McMILLIN, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining Some Challenged Claims Unpatentable

35 U.S.C. § 318(a)

Denying Patent Owner's Motion to Strike

37 C.F.R. § 23(b)

Denying Petitioner's Motion to Exclude

37 C.F.R. § 42.64(c)

Microchip Technology Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 13, 14, and 18–20 (“the challenged claims”) of U.S. Patent No. 9,619,420 B2 (Ex. 1003, “the ’420 patent”). Aptiv Technologies AG (“Patent Owner”) filed a Preliminary Response (Paper 10, “Prelim. Resp.”). We instituted the petitioned review (Paper 13, “Inst. Dec.”).

Patent Owner filed a Patent Owner Response (Paper 20, “PO Resp.”) to oppose the Petition. Petitioner filed a Reply (Paper 25, “Pet. Reply”) to the Patent Owner Response. Patent Owner filed a Sur-reply (Paper 33, “PO Sur-reply”) to the Reply. We conducted an oral hearing on April 16, 2025. A transcript has been entered into the record (Paper 48).¹

We have jurisdiction under 35 U.S.C. § 6(b)(4) and § 318(a). This Decision is a final written decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of claims 13, 14, and 18–20 of the ’420 patent. We determine Petitioner has shown by a preponderance of the evidence that claims 13 and 14 of the ’420 patent are unpatentable and that claims 18–20 have not been shown to be unpatentable.

I. BACKGROUND

A. *Real Parties-in-Interest*

Petitioner identifies itself and its subsidiaries as the real parties-in-interest. Pet. 93. Patent Owner identifies itself and Aptiv Services US, LLC as the real parties-in-interest. Paper 6, 2.

¹ The oral argument in this proceeding was consolidated (see Paper 32) with the oral argument in IPR2024-00228, IPR2024-00229, and IPR2024-00230 that involve the same parties, the same or related patents, and the same prior art. See Section I.B. (Related Matters) (next page).

B. Related Matters

The parties identify the following proceedings related to the '420 patent or patents in the same family (Pet. 93; Paper 6, 2–3):

Aptiv Technologies AG v. Microchip Technology Inc., Case No. 1:23-cv-00307-JDW (D. Del. March 20, 2023);

Microchip Technology Inc. v. Aptiv Technologies AG, IPR2024-00228 (PTAB filed December 27, 2023);

Microchip Technology Inc. v. Aptiv Technologies AG, IPR2024-00229 (PTAB filed December 27, 2023);

Microchip Technology Inc. v. Aptiv Technologies AG, IPR2024-00230 (PTAB filed December 27, 2023); and

Microchip Technology Inc. v. Aptiv Technologies AG, PGR2024-00011 (PTAB filed December 27, 2023);

Microchip Technology Inc. v. Aptiv Technologies AG and Aptiv Technologies Limited, IPR2024-00494 (PTAB filed February 27, 2024);

Microchip Technology Inc. v. Aptiv Technologies AG and Aptiv Technologies Limited, IPR2024-00496 (PTAB filed February 27, 2024); and

Microchip Technology Inc. v. Aptiv Technologies AG and Aptiv Technologies Limited, IPR2024-00558 (PTAB filed February 27, 2024).

In the IPR2024-00228 proceeding, Petitioner challenged claims 1–12 and 15–17 of the '420 patent. See Paper 4 (“Petitioner’s Explanation for and Ranking of Two Petitions Challenging U.S. Patent No. 9,619,420”). On July 11, 2025, a final written decision was entered in IPR2024-00228 determining that claims 1–12 and 15–17 of the '420 patent were unpatentable. IPR2024-00228, Paper 57. To the extent applicable in this

proceeding, we incorporate herein our reasoning, findings, and conclusions from the final written decision in IPR2024-00228.

C. The '420 Patent

The '420 patent relates to a system to “enable a vehicle’s embedded USB (Universal Serial Bus) host system to connect to multiple mobile devices through a USB hub, regardless of whether the mobile devices are configured to act as USB hosts or USB devices,” without USB On the Go (OTG) controllers or additional vehicle wiring or inhibiting the functionality of any consumer devices. Ex. 1003, code (57).

The '420 patent explains

USB protocols require a point-to-point connection in which one end is the USB Host or master, and the other end is a USB Device or slave. In this way, the flow of messages between the two devices is managed and controlled, whereby the USB Device responds to messages initiated by the USB Host.

Id. at 1:33–39. The patent further describes that in vehicle systems that employ USB connections, the vehicle is typically the USB host and the USB host function is often embedded into a component of the vehicle infotainment system, such as into the radio or other control module. *Id.* at 1:45–57.

As described in the patent, leading mobile device manufacturers and system designers began designing their mobile device products (such as smartphones) to support both USB host and USB device roles. *Id.* at 2:56–65. In other words, a phone may configure itself such that it can function as a USB device or as a USB host. *Id.*

If a phone acts as a USB host, then the vehicle system will not function because, by USB convention, two USB hosts cannot directly

connect with each other. *Id.* at 3:4–17. The '420 patent states that existing solutions to this problem such as On the Go (OTG) technology and dynamic swapping of ports have disadvantages. *Id.* at 3:18–67.

The '420 patent summarizes the invention as follows:

An embodiment of the present invention provides a system which can be employed between a vehicle's embedded USB Host and at least one, but preferably multiple, consumer facing USB ports provided in the vehicle for connection to consumer devices. The system is configured to recognize and control whether the consumer device is required to be connected to each USB port as a USB Host or as a USB Device. Further, the system is able to dynamically switch the device connection between USB Device mode and USB Host mode when desired. In the case where the consumer device is acting as a USB Device, signals are routed normally through a USB Hub to the Head Unit. In the case where the consumer device is acting as a USB Host, signals between the consumer device and the vehicle's embedded USB Host are routed and processed through a USB Host to Host Bridge which is connected to the USB Hub, thereby rendering the consumer device compatible with the vehicle's embedded USB Host.

Id. at 4:12–30.

Figure 4, reproduced below, illustrates an embodiment wherein a USB hub, a USB bridge, and a switching device are provided as discrete components. *Id.* at 5:21–24.

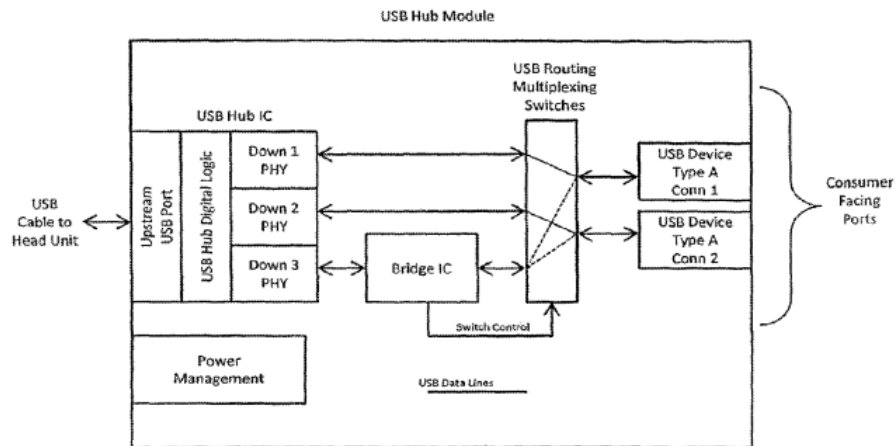


Figure 4 depicts a system configured to render a vehicle's embedded USB host compatible with consumer devices configured to act as a USB host or as a USB device. *Id.* at 5:46–6:18. The system is in the form of a USB hub module having a USB hub IC (integrated circuit), a USB bridge IC, and a switching device having switches. *Id.* The USB hub IC is configured to be connected (via an upstream USB port) to a vehicle's embedded USB host (such as a USB host in a head unit) via vehicle internal wiring. *Id.*

The USB hub IC also includes three downstream USB ports, one of which is connected to the USB bridge IC. *Id.* The other two downstream USB ports of the USB hub IC are connected directly to the switches, such as multiplexing switches. *Id.* The switches are connected to two USB ports in the vehicle, for connection to a consumer device. *Id.* The USB bridge effectively controls the switches. *Id.* The USB hub module is configured such that signals received from a USB port are received by the switching device, and the switching device routes the signals to the USB bridge or the USB hub. *Id.*

In the case where the consumer device is acting as a USB host, the USB bridge IC processes the USB packets from the consumer port and

provides them to the USB hub IC, thereby rendering the consumer device compatible with the vehicle's embedded USB host. *Id.* The bridge may be bidirectional and pass USB traffic between two USB hosts. *Id.* at 7:54–66. In the case where the consumer device is acting as a USB device, the USB bridge IC controls the switching device such that the switching device provides the USB signaling directly to the USB hub, bypassing the bridge. *Id.* at 6:10–13.

“The architecture illustrated is capable of handling both the operation and data paths associated with the Bridge and the Hub at the same time, thus allowing concurrent operation of consumer devices operating in USB Device mode with consumer devices operating in USB Host mode.” *Id.* at 8:59–63.

D. Challenged Claims

As noted previously, claims 13, 14, and 18–20 of the '420 patent are challenged. Claim 13 is an independent method claim and claim 14 depends from claim 13. Claims 13 and 14 recite:

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;

connecting the consumer device via the second USB port to the USB **hub[host]**² via the first USB port through the

² Claim 13 as issued recites “hub” in both bolded instances. Ex. 1003, 10:51, 10:57. The shown changes to challenged claim 13 are corrections to claim 13 proposed by the Patent Owner in the district court litigation between the parties. *See* Pet. 23–28. Petitioner argues that, if these changes are adopted in the district court litigation, we should adopt these changes and

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[host]** 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.

14. The method according to claim 13, wherein the step of determining if when the consumer device is operating in the USB host mode or in the USB device mode is performed by the USB routing switch.

Ex. 1003, 10:41–65.

E. Cited Art

Petitioner relies on the following references:

U.S. Patent Application Publication No. 2006/0206650 A1, filed August 16, 2005, published September 14, 2006 (Ex. 1014, “Chang”); and

U.S. Patent Application Publication No. 2009/0268743 A1, filed May 22, 2008, published October 29, 2009 (Ex. 1015, “Chang II”).

F. Asserted Ground

Petitioner challenges claims 13, 14, and 18–20 of the ’420 patent based on the following ground (Pet. 4):

Petitioner presents its unpatentability arguments against the rewritten claim 13. *Id.* The shown changes to claim 13 were adopted by the District Court. Paper 11, 1; Ex. 1080, 7–9. As explained *infra*, we adopt the shown changes to claim 13. See Section II.E.3.b. (Correction of Claim 13).

Claims Challenged	35 U.S.C. §	References
13, 14, 18–20	103	Chang, Chang II

II. ANALYSIS

A. Legal Standards

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner except in limited circumstances not present here. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of non-obviousness, if present. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966). When evaluating a claim for obviousness, we also must “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

B. Level of Ordinary Skill in the Art

We review the grounds of unpatentability in view of the understanding of a person of ordinary skill in the art at the time of the invention (“POSITA”). *Graham*, 383 U.S. at 13, 17. In assessing the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962–63 (Fed. Cir. 1986)). “In a given case, every factor may not be present, and one or more factors may predominate.” *Id.*

The entire section of the Petition directed to level of ordinary skill in the art states:

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.

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. Welch, ¶¶45-49.^[3] A relevant advanced degree may substitute for some work experience. Similarly, relevant work experience may substitute for formal education. *Id.*

Pet. 22–23. Petitioner cites the Declaration of Eric Welch, paragraphs 45–49 (Ex. 1013 ¶¶ 45–49), but there is no explanation or reasoning provided in the Petition or in the cited declaration supporting Petitioner’s definition of the level of skill in the art.

Patent Owner contends:

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, ¶ 27.)

PO Resp. 3–4. Patent Owner cites paragraph 26 of the Supplemental Declaration of Henry Houh (Ex. 2019 ¶ 26⁴) and argues against adopting

³ The Welch Declaration states that “A POSITA would have had . . . four years of experience designing USB systems, including USB hosts, USB hubs, and USB devices,” rather than “substantial experience (*e.g.*, several years)” as stated in the Petition. *Compare* Ex. 1013 ¶ 47 with Pet. 23. We also note that, although the Petition cites paragraphs 45–49 of the Welch Declaration (Ex. 1013), the material set forth in the Petition is found (almost verbatim) entirely in paragraph 47. *Compare* Pet. 22–23 with Ex. 1013 ¶¶ 45–49.

⁴ In its Preliminary Response, Patent Owner set forth an identical contention as to the level of skill in the art, but cited to paragraph 26 of the Declaration of Henry Houh (Ex. 2001 ¶ 26). Prelim. Resp. 13. Both Houh Declarations contain this identical paragraph supporting Patent Owner’s contention:

My opinions regarding the level of ordinary skill in the art are based on, among other things, my industry experience hiring and managing technical personnel in the computer

Petitioner’s proposed level of skill in the art. *Id.* at 3–4. Specifically, Patent Owner argues:

Petitioner proposes an elevated and specific level of ordinary skill that requires fluency with specialized documents and technologies, including particular USB standards documents, and with “the design/deployment of USB hosts, USB devices, and USB hubs, including suitable environments for USB systems.” (Petition, 23-24.) Petitioner also proposes that the POSITA would have a “working understanding” of specific technologies, including “host-to-host bridges.” (Petition, 23-24.)

Petitioner’s artificially heightened definition of the level of ordinary skill should be rejected. Petitioner’s proposal does not reflect the actual level of ordinary skill, but instead inflates the scope of the “POSITA Knowledge” on which the Petition relies to fill evidentiary gaps left by the prior art. (EX2019, ¶28.) Petitioner’s definition lacks evidentiary support, relying only on conclusory statements from its expert, who concedes—contrary to Petitioner’s insertion of specific required USB documents and systems into its definition—that the challenged patents pertain “generally” to the field of USB connectivity, and that “other technical fields may be relevant.” (EX1013, ¶47.)

The Board should adopt Patent Owner’s definition of the level of ordinary skill, as it did in the Decision on Institution.^[5]

networking field, and my understanding of the basic qualifications that would be relevant to an individual tasked with investigating methods and systems in the relevant area, and my familiarity with the backgrounds of colleagues, both past and present.

Ex. 2001 ¶ 27; Ex. 2019 ¶ 30. In contrast, Petitioner’s expert does not state the basis of his opinion on the level of ordinary skill in the art. *See* Ex. 2013 ¶¶ 45–49.

⁵ Patent Owner’s reliance on our Decision on Institution is not well-placed. The Decision on Institution stated, “No matter how designated in this Decision, any determination (except our decision to institute trial) is preliminary and non-binding. We wish to have the full record as developed

Patent Owner’s definition is supported by Dr. Houh’s testimony and, as the Board recognized, is “consistent with what is reflected by the content of the applied prior art references.” (DI (Paper 12), 11 (citing *Okajima v. Bourdeau*, 261 F.3d 1350, 1354-55 (Fed. Cir. 2001)).)

Id. at 4. Patent Owner’s criticism of Petitioner’s contention has merit especially as to the lack of evidentiary support in the Petition for Petitioner’s definition of the level of ordinary skill in the art. Particularly, there is no evidence that, or explanation why, a POSITA “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;” “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;” and “substantial experience (*e.g.*, several years) designing USB systems, including USB hosts, USB hubs, and USB devices.” *See* Pet. 22–23. Accordingly, we reject these aspects of Petitioner’s proposed definition because they lack evidentiary support.

In its Reply, Petitioner suggests that we need not resolve the dispute between the parties as to the definition of level of skill in the art because “Petitioner agrees the Challenged Claims are unpatentable under either articulation.” Pet. Reply 2; *see also id.* at 3 (“To the extent

during trial before rendering any binding determination, finding, or conclusion.” Inst. Dec. 43–44 n.13.

P[atent]O[wner]’s more generic statement encompasses the same substantive knowledge base, little difference exists between the parties’ definitions and the prior art analysis is substantially the same.”) *and id.* at 4 (“[E]ven under P[atent]O[wner]’s definition, the Challenged Claims are unpatentable.”).

The parties and their declarants largely agree that a POSITA would have at least a bachelor’s degree in electrical engineering or computer science and at least two years of professional experience related to working with computer network protocols such as USB. *Compare* Pet. 22–23 *with* PO Resp. 3–4. And, the parties and their declarants also agree that a relevant advanced degree or additional education may take the place of at least some work experience and that work experience may take the place of some formal education. *Id.*

Because Patent Owner’s definition of the level of skill in the art is consistent with the ’420 patent and the asserted prior art, we adopt the Patent Owner’s definition of the level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC*, 57 F.3d at 1579; *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978). Moreover, we credit Dr. Houh’s testimony articulating this definition, as it is based on his “industry experience hiring and managing technical personnel in the computer networking field, and [his] understanding of the basic qualifications that would be relevant to an individual tasked with investigating methods and systems in the relevant area, and [his] familiarity with the backgrounds of colleagues, both past and present.” Ex. 2019 ¶ 30 (providing basis for proffered definition); Ex. 2001, Appx A; PO Resp. 4–5. Thus, we determine that, at the time of the invention, a person of ordinary skill in the art (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. And, a lack of work experience can be remedied by additional education, and vice versa.

Petitioner contends that a POSITA would have more familiarity and experience with USB related documents and systems than contended by Patent Owner. 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 ordinary skill was enhanced, our decision that challenged claims 13 and 14 are unpatentable would be further supported. However, our decision on obviousness is supported by either of the definitions offered by the parties.

C. Claim Construction

In an *inter partes* review, the claim construction standard is the same as that of a district court. See 37 C.F.R. § 42.100(b). Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Petitioner states that it “believes the plain and ordinary meaning applies without further construction.” Pet. 26.⁶ Similarly, “Patent Owner does not contend that any further claim construction is required. The claims are not obvious under any reasonable interpretation of the claims.” PO Resp. 6.

We agree with the parties and determine that no claim terms require express construction. *See, e.g., Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))). We apply the plain and ordinary meaning to all the claim terms.

D. Declaration of Dr. Houh

Petitioner argues “Dr. Houh’s testimony merits no weight because he: (1) copied his declaration; and (2) lacks the qualifications/ knowledge of a POSITA and is not credible.” Pet. Reply 4. In particular, Petitioner contends that “Dr. Houh copied his prior art analysis word-for-word from the POR.” *Id.* at 5 (citing Ex. 2019 ¶¶ 53–142; Ex. 1091–1095). According to Petitioner, “copycat declarations--like Dr Houh’s – are entitled to little/no weight.” *Id.* (citing *Xerox Corp et al. v. Bytemark, Inc*, IPR2022-00624,

⁶ Petitioner contends that we should adopt changes to claims 13, 18, and 19 proposed by the Patent Owner in the district court litigation between the parties to correct errors in these claims, but, only if, the District Court adopts the changes as judicial corrections. *See* Pet. 23–28. For the reasons discussed *infra* (see Sections II.E.3.b. (Correction of Claim 13) and II.E.4.a. (The Alleged Errors in Claims 18 and 19)), we adopt the changes to claim 13 but do not adopt the changes to claims 18 and 19.

Paper 12, 5 (PTAB Aug. 24, 2022) (precedential)). Petitioner further argues Dr. Houh “is simply not an expert (or POSITA) in the USB technology here.” *Id.* According to Petitioner, because Dr. Houh lacks USB experience to render any opinions under Petitioner’s standards, his testimony should be afforded little to no weight as the PTAB has done in previous IPRs involving Dr. Houh. *Id.* at 5–6.

Regarding argument (1), we decline to delve into how Dr. Houh’s declaration testimony was prepared. Regarding argument (2), Petitioner’s reliance in part on Dr. Houh’s deposition testimony (Ex. 1084) on page 80, lines 9–19 and page 82, line 14,⁷ to page 83, line 12 is of little relevance because it relates to whether Dr. Houh qualifies as a POSITA under Mr. Welch’s definition, which we do not adopt. *Id.* Further, Dr. Houh testifies that his Ph.D. in networking substitutes for professional experience working with USB. *Id.* As discussed above, under Patent Owner’s definition of a POSITA, which we adopted for the purpose of this Decision, we find that Dr. Houh’s testimony should be considered in light of his advanced studies in networking coupled with his experience in the field. On this record, we find that Dr. Houh possesses, at a minimum, a working knowledge and understanding network protocols including USB standards and systems to adequately render a learned opinion about the facts before us. Additionally, because the facts in the related IPRs cited by Petitioner are not before us, we decline Petitioner’s invitation to rely upon these non-related cases to impugn the validity of Dr. Hugh’s testimony in the present proceeding.

⁷ Exhibit 1084, 82:14, appears to be a typographical error because line 14 is in the middle of an answer.

Accordingly, we are not persuaded by Petitioner’s argument that Dr. Houh’s testimony should be given no weight.

E. Obviousness Based on Chang and Chang II

Petitioner contends that claims 13, 14, and 18–20 would have been obvious over Chang in view of Chang II and POSITA knowledge. Pet. 4, 36–87. Patent Owner argues that “[a]ll claims of the ’420 patent are not unpatentable, as the grounds in the Petition are meritless.”⁸ PO Resp. 1.

We provide summaries of the cited art, Chang and Chang II. We then address the arguments and evidence relating to whether the cited art teaches or suggests the limitations of the claims and whether a motivation existed to combine the relevant teachings of the cited art with a reasonable expectation of success. We also analyze the arguments and evidence related to the secondary considerations of non-obviousness. Although it is necessary to divide up these arguments and the related evidence for purposes of setting forth our analysis, our determination as to the unpatentability of the challenged claims is based on consideration of all the arguments and evidence as a whole.

1. Chang

Chang relates to “a hub and more particularly to a hub with a host-to-host transmission function.” Ex. 1014 ¶ 1. Figure 2 illustrates a conventional USB hub and is reproduced below. *Id.* ¶ 13.

⁸ There is only one ground presented in the Petition. See Pet. 4.

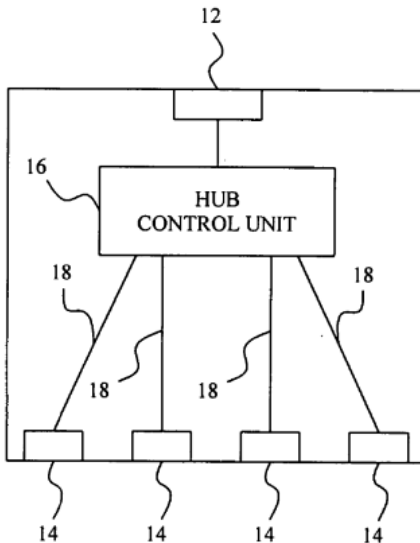


Figure 2 depicts a USB hub including uplink port 12 for being linked to a host, downlink ports 14 for being linked to other devices, and hub control unit 16. *Id.* ¶ 18. In the USB hub, several transmission paths 18 may be established such that uplink port 12 can communicate with each downlink port 14 such that uplink port 12 can communicate with devices linked to each downlink port 14 via hub control unit 16. *Id.*

Chang summarizes the invention as:

a hub with a host-to-host transmission function comprises a hub control unit, an uplink port connected to the hub control unit for being linked to a first host, a host port for being linked to a second host, and a bridge connected between the host port and hub control unit for the first and second hosts to communicate with each other.

Id. ¶ 5. Figure 3 illustrates a hub according to the Chang invention and is reproduced below. *Id.* ¶ 19.

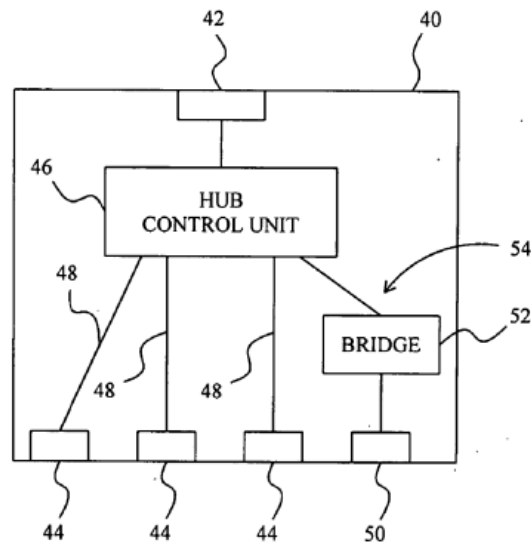


Figure 3 depicts hub 40, uplink port 42 for being linked to a host, several downlink ports 44 for being linked to devices, and hub control unit 46 for establishing several transmission paths 48 between uplink port 42 and downlink ports 44 such that the host linked to uplink port 42 can communicate with the devices linked to downlink ports 44. *Id.* Hub 40 further comprises host port 50 for being linked to a host, and bridge 52 connected between hub control unit 46 and host port 50. *Id.* ¶ 20. Bridge 52 provides a function for host-to-host communications, and may be implemented with a bridge chip, for example, OTi2108 of Ours Technology Inc. or other host-to-host transmission chip. *Id.* ¶¶ 20, 22, 24.

2. Chang II

Chang II relates 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.” Ex. 1015 ¶ 2.

Chang II states that the invention:

solve[s] the technical limitation of the prior art, by designing a data transmission bridge device and control chip thereof for transmitting data between two nearby hosts; wherein the device would automatically detect the connecting device type and accordingly switch between different transmission paths, which would not only allow for support of data transfer between a host device and a slave device, but also can directly support data transfer between two host devices.

Id. ¶¶ 11, 12.

Figure 1 is a schematic diagram for a data transmission bridge device and control chip thereof for transmitting data according to the Chang II invention and is reproduced below. *Id.* ¶ 15.

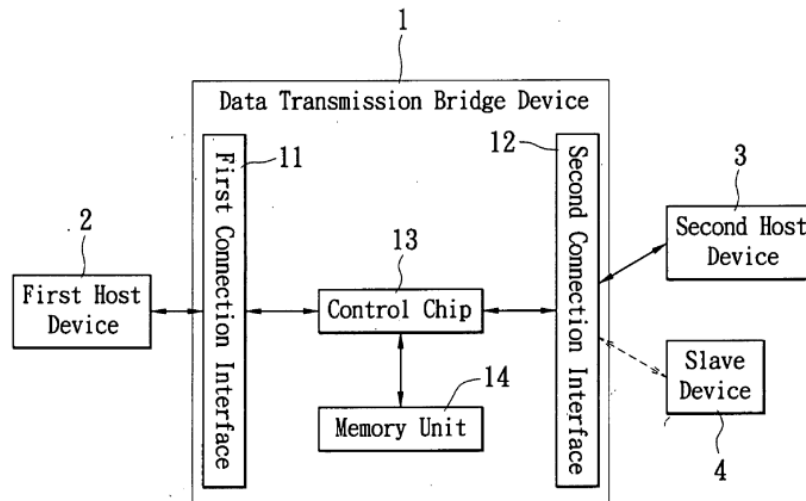


Figure 1 depicts data transmission bridge device 1 including first connection interface 11 for connecting to first host device 2, second connection interface 12 for connecting to second host device 3 or slave device 4, control chip 13 enabling connection to a detected host/slave device, and memory unit 14 for storing control data. *Id.* ¶¶ 22, 23.

Figure 5 is a schematic diagram for a control chip 13 within data transmission bridge device 1 for transmitting data according to the Chang II invention and is reproduced below. *Id.* ¶¶ 19, 34.

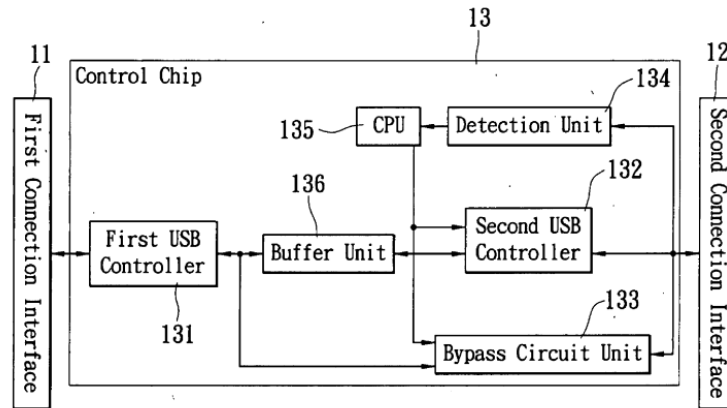


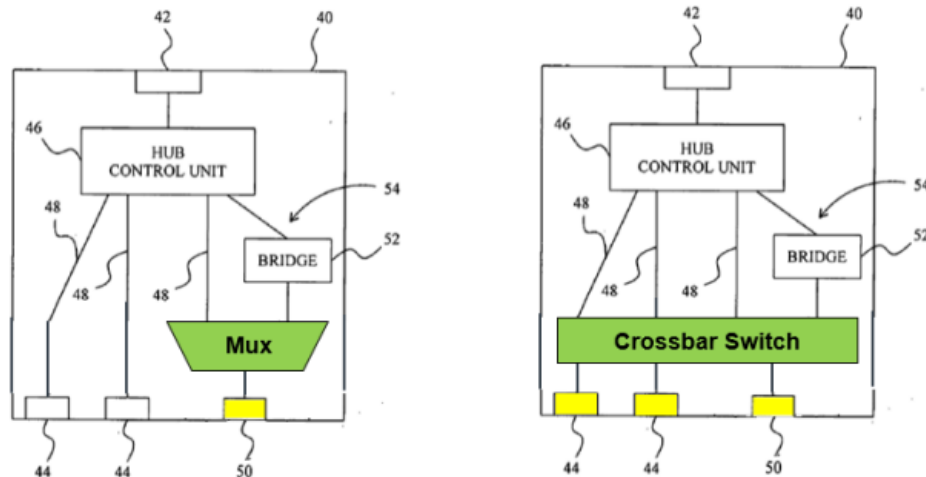
FIG. 5

Figure 5 depicts control chip 13 for data transmission bridge device 1. *Id.* ¶ 34. Chip 13 includes first USB controller 131, second USB controller 132, bypass circuit unit 133, detection unit 134, central processing unit (CPU) 135, and buffer unit 136. *Id.* The data transmission bridge device “by automatically detecting the type of connected device to switch between the proper transmission path, can not only support data transmission between a host device and a slave device, but can also directly support data transmission between two host devices.” *Id.* ¶ 46.

3. Claims 13 and 14

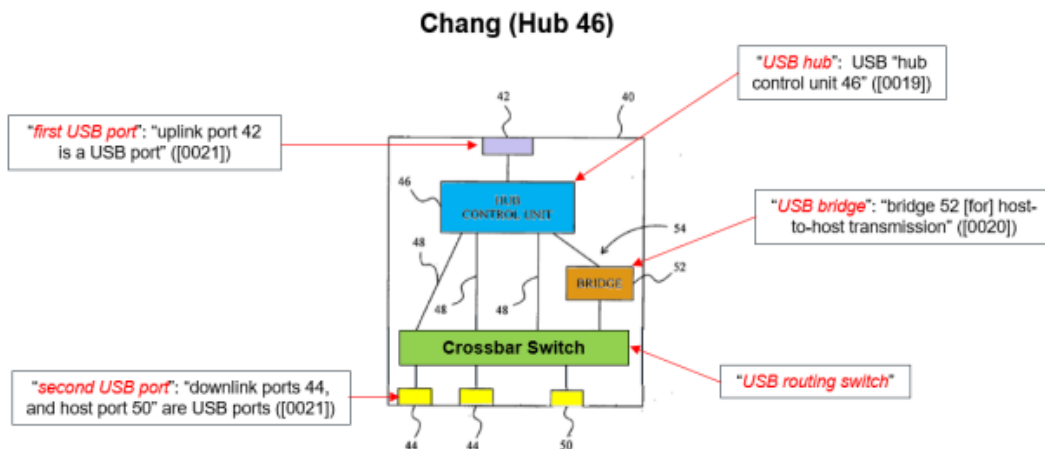
a. Overview of Petitioner’s Showing

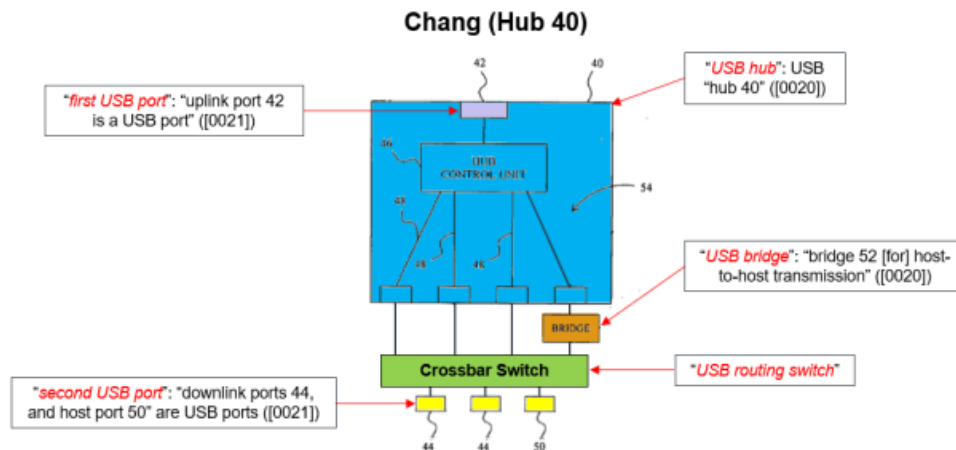
Petitioner challenges claims 13 and 14 of the ’420 patent as unpatentable as obvious in view of Chang and Chang II. Pet. 4. Petitioner contends that there are two obvious implementation options for modifying Chang’s Figure 3 that are shown in the figures reproduced below. *Id.* at. 42–43.



As depicted in the figure on the left, above, an added 2:1 multiplexer (Mux) serves as a switch (directing signals to bridge 52 or bypassing bridge 52) and port 50 serves as a dual-role port. *Id.* As depicted in the figure on the right, above, an added crossbar switch serves as a switch (directing signals to bridge 52 or bypassing bridge 52) and each of ports 44 and 50 serves as a dual-role port. *Id.*

Petitioner argues the right-hand crossbar implementation comes in two variations. Pet. 45–46. In one version (Chang (Hub 46)) the crossbar is inside hub 40 and in another version (Chang (Hub 40)) the crossbar is outside hub 40. *Id.* The Chang (Hub 46) implementation and the Chang (Hub 40) implementation are reproduced below.





Id. at 48–49. The Chang (Hub 46) implementation and the Chang (Hub 40) implementation are depicted above along with Petitioner’s mapping of claim 13 to each implementation. *Id.*

Patent Owner argues that “Petitioner’s proposed combination—including all three implementations—is incompletely described in the Petition; and is technically unsound and would not be operable in the manner set forth in the Petition.” PO Resp. 19 (citing Ex. 2019 ¶ 75). Specifically, Patent Owner argues that “the proposed combination relies on Chang II’s control chip 13 and detection unit 134 in the bridge to provide the control signals that cause the crossbar to route the downstream ports through the appropriate transmission path” (*id.* at 24–25) “[b]ut in the proposed combination, the control chip and detection unit (in the bridge) are *separated* from the downstream ports (*i.e.*, 44, 50) by the routing switch—*i.e.*, a crossbar” (*id.* at 26–27 (citing Ex. 2019 ¶ 88)). Patent Owner explains:

When the bridge device is bypassed by the crossbar, it is thus electrically disconnected from the downstream USB ports coupled to the crossbar. (EX2019, ¶92.) Because the bridge device and its control chip and detection unit cannot send or receive signals (*e.g.*, “inquire signals”) from a downstream USB port in this state, the bridge device is rendered incapable of detecting whether a device is in host or device mode, such as

described above for FIG. 6 of Chang II. (EX2019, ¶¶92). This, accordingly, prevents the bridge device and the control chip and the detection unit from generating the bridging detection signal, or otherwise providing control signals to the crossbar. (EX2019, ¶¶92.) Consequently, once the USB hub module in the proposed combination switches to the device mode, it is *incapable* of directing the crossbar to perform any further switching operations—including connecting or reconnecting any downstream ports to the bridge 52 or to the hub control unit 46 (*e.g.*, in response to a connected device switching to a host or device mode). (See Petition, 33–36; EX1013, ¶¶80, 159, 251; EX2019, ¶¶92.)

Id. at 31. Patent Owner misunderstands the combination of teachings asserted by Petitioner. Accordingly, Patent Owner’s argument is not well-founded and not persuasive.

As acknowledged by Patent Owner, in Petitioner’s combination as presented in the Petition (*see, e.g.*, Pet. 58–59) and testified to by Petitioner’s expert declarant, the detection unit must be connected to the downstream ports. See PO Resp. 1 (“As Petitioner’s expert, Mr. Welch, cautions: ‘the detection unit *must connect* to the downstream port to detect the mode, as shown in Chang II.’” (citing Ex. 1013 ¶ 193 (emphasis added by Patent Owner))); *see also id.* at 26, 53 (same quote from Welch repeated). Patent Owner does not meaningfully challenge this testimony. The premise of Patent Owner’s argument—in the combination asserted in the Petition with support from an expert declarant, the detection unit is disconnected

from the downstream ports—is faulty.⁹ Patent Owner’s conclusory assertion without adequate support lacks merit.

Patent Owner contrives this faulty premise by surmising that because, in Chang II, the detection unit is in the control chip of the bridge that, in Petitioner’s combination, the detection unit must be located in the bridge. See PO Resp. 24–25. This argument is based upon the substitution of Chang II’s control chip 13 including detection unit 134 for Chang’s bridge 52. *Id.* (“[T]he proposed combination relies on Chang II’s control chip 13 and detection unit 134 in the bridge to provide the control signals that cause the crossbar to route the downstream ports through the appropriate transmission path.”). However, the proper test for obviousness is not whether the references may be physically combined or one prior art device may be bodily incorporated into another, but is whether the teachings of the cited art would have been combined by a skilled artisan in the manner recited in the claims. *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016); *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985 (en banc)) (explaining that the test for obviousness is “not whether the references could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole”); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for obviousness is not whether the 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

⁹ Petitioner contends that “[t]he P[atent] O[wner] R[esponse] manufactures a purported ‘structural flaw’ only by misstating the operation of Petitioner’s proposed combination.” Paper 38, 1.

references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.”).

And, Patent Owner’s argument improperly ignores, and, thus, fails to address, Chang II’s clear teachings that the detection unit 134 is directly connected to the downstream port. See Ex. 1015, Fig. 5 (reproduced below); see also Pet. 58–59 (discussing limitation in claim 13 reciting “determining when the consumer device is operating in a USB host mode and in a USB device mode” and citing Figure 5 of Chang II).

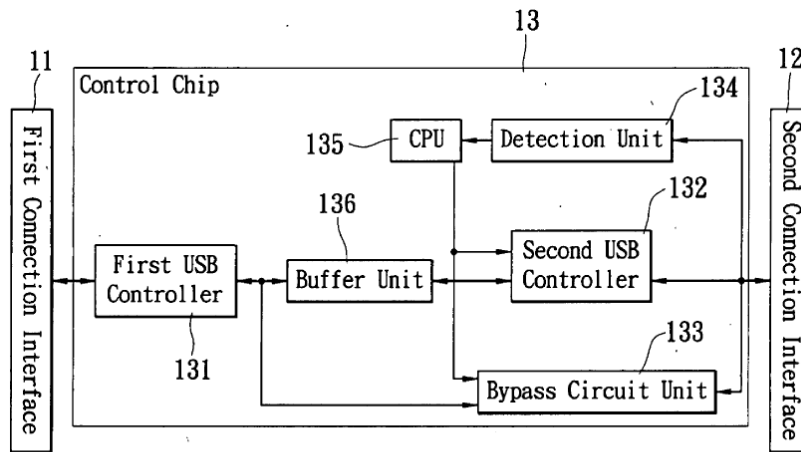


FIG. 5

Figure 5 depicts detection unit 134 directly connected to second connection interface 12. And, the detailed description of Figure 5 provides: “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 (bridge detection signal or slave detection signal) is produced accordingly.” Ex. 1015 ¶ 38.

Patent Owner’s arguments are otherwise misplaced. None of the claims of the ’420 patent recites a detection unit and, thus, the challenged

claims are not construed as being limited to requiring a detection unit in any particular location or to requiring a detection unit connected in any particular manner.¹⁰ Patent Owner fails to provide any detail as to where the claims describe a detection unit or which exact limitations require a detection unit.¹¹ *See generally* PO Resp. The preamble of independent method claim 13 recites “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.” Ex. 1003, 10:41–46. Claim 13 includes the following step, “determining when the consumer device is operating in a USB host mode and in a USB device mode” (*id.* at 10:48–49) and dependent claim 14 recites, “wherein the step of determining if when the consumer device is operating in the USB host mode or in the USB device mode is performed by the USB routing switch” (*id.* at 10:62–65). These claims recite determining whether the consumer device is operating in the USB host mode or a USB device mode (independent claim 13) and that this

¹⁰ The claims in US Patent No. 11,681,643 B2 (Ex. 1011) that is owned by Patent Owner and challenged by Petitioner in PGR2024-00011 recite, “a signal detection circuit for receiving USB signals from the consumer device via the second USB port” (*id.* at 9:21–23 (independent claim 1)), and “the USB routing switch includes the signal detection circuit” (*id.* at 9:44–45 (dependent claim 4)). *See also id.* at 9:51–52 (independent claim 5 reciting “a signal detection circuit”), 10:16–17 (dependent claim 9 reciting “the signal detection circuit”)

¹¹ Neither party articulates a claim construction that requires a “detection unit.” *See* Pet. 23–28 (addressing “Claim Interpretation”); PO Resp. 5–6 (addressing “Claim Construction”).

determination is performed by the USB routing switch (dependent claim 14). The claims do not recite how the determination is made and the '420 patent does not provide any details regarding this operation. No claim is limited to a “detection unit” or any particular structure or method for the recited “determining” step.¹² See Pet. 59 (“any known host/device detection technique could be (and would have been) used in the Crossbar Implementations”) (citing Ex. 1013 ¶ 248)). And, the specific recitation in dependent claim 14 that “the step of determining . . . is performed by the USB routing switch” indicates that independent claim 13 should not be so limited.¹³ Patent Owner is impermissibly attempting to write a limitation into the claims. See *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

Patent Owner argues that the Petition lacks particularity with regard to how the detection unit in the proposed combination would be implemented (see PO Resp. 19–23), but any such lack of particularity is understandable as the claims also lack particularity as to the detection unit. Stated differently,

¹² The '420 patent's specification does not describe a detection unit. See Ex. 1003, 6:28–30 (“The detection and enumeration processes are defined by USB standards and not explained here in detail.”); see also Pet. 69 (“The '420 specification is silent regarding where host/device detection takes place or what component makes that determination.”). The specification of a patent can make plain what a patentee did and did not invent. *Phillips*, 415 F.3d at 1315. Moreover, neither party offers a claim construction or any other argument that the claims of the '420 patent are limited to any particular structure for, or operation of, a detection unit.

¹³ A limitation in the dependent claims can give rise to a presumption that the limitation is not present in the independent claims. See *Liebel - Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004) (citing cases discussing “the presumption that an independent claim does not have a limitation that is introduced for the first time in a dependent claim”).

the fundamental flaw in this argument is the claims do not recite a detection unit and it was unnecessary for Petitioner to be particular as to the detection unit in order to establish unpatentability. As shown below, the Petition is particular as to the limitations recited in the challenged claims.

b. Correction of Claim 13

In the district court litigation between the parties, Patent Owner contended that claim 13 had two obvious errors that should be corrected. *See* Pet. 25–26; PO Resp. 5. Patent Owner proposed rewriting independent claim 13 by twice replacing “hub” with –host— as shown in claim 13 as reproduced above. *See* Section I.D. (Challenged Claims) *supra*. In the district court litigation, Patent Owner proposed rewriting claim 13 as shown as a “judicial correction” (*see* Pet. 23 (citing Ex. 1076 (Patent Owner’s Opening Claim Construction Brief), 1–4)) and argued that “[e]ach error would have been obvious to a person of ordinary skill in the art (‘POSITA’) and should be judicially corrected” (Ex. 1076, 1). “Petitioner opposes [Patent Owner]’s attempt to re-write the claims in the district court.” Pet. 23 (citing Ex. 1077 (Petitioner’s Responsive Claim Construction Brief), 7-10). The shown changes to claim 13 were adopted by the District Court. Paper 11 (Notice of District Court *Markman* Order), 1; Ex. 1080 (District Court’s claim construction Order and Memorandum), 1–2, 10–12. The District Court reasoned:

[Patent Owner] says that the claim language contains an obvious error in need of revision because the patent should recite a connection from the consumer device to the “USB host,” not the “USB hub.” I may correct an error in a patent claim only when it is “evident from the face of the patent.” *H-W Tech., LC v. Overstock.com, Inc.*, 758 F.3d 1329, 1333 (Fed. Cir. 2014). I can only order such a correction when it is “(1)

. . . not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims.” *Novo Indus., LP. v. Micro Molds Corp.*, 350 F.3d 1348, 1357 (Fed. Cir. 2003).

The language of the claim and specification make clear that there’s a scrivener’s error in the claim. Claim 13 is a method claim for determining when the consumer device is operating as a host (and therefore controlling the infotainment unit) or a device (and therefore under the infotainment unit’s control). The invention requires communication between the USB host and the consumer device, which happens across a bridge when both are in host mode. As written, Claim 13 does not allow for that connection between the consumer device and the vehicle’s infotainment system (the USB *host*). Instead, the claim language connects the consumer device to the USB hub via the first USB port. The written connection does not allow for “bidirectional initiation of communication between the USB *host* and the consumer device” because the connection stops short of the host (ending at the hub). (‘420 Patent at 10:53-54.)

[Patent Owner]’s proposal fixes this issue and is consistent with the invention that the patent discloses. The remainder of the claims provide for communication between the consumer device and the host via the first USB port. The specification summarizes the invention as “provid[ing]^[14] a system which is configured to enable a vehicle’s embedded USB Host system to connect to mobile devices through a USB Hub, regardless of whether the mobile devices are configured to act as USB Hosts or USB Devices” (‘420 Patent at 4:3-7.) Without this correction, the patent’s entire purpose is frustrated.

The need for correction isn’t subject to reasonable debate. [Petitioner] proffers a configuration, but it’s inconsistent with the claim language. The claim requires that the “first USB port” be “connected to [a]^[6] USB host.” (‘420 Patent at 10:42-43.) In [Petitioner]’s diagram, the first USB port is within the routing switch, not connected to it. There’s some indirect link between the first USB port and the USB

¹⁴ These alterations in original.

host, but that’s not consistent with what the claim language requires. The question is not simply whether [Petitioner]’s configuration is operable. What matters is whether a configuration faithful to the claim language is operable. [Petitioner] hasn’t conceived of such a configuration, nor can I. As a result, the claim language and specification make clear on the face of the patent that I should revise the claim language.

Ex. 1080, 7–9.

Our rule relating to claim construction provides that “[a]ny prior claim construction determination concerning a term of the claim in a civil action . . . that is timely made of record in the *inter partes* review proceeding will be considered.” 37 C.F.R. 42.100(b). We have considered the District Court’s claim construction Order and Memorandum (Ex. 1080) that was timely made of record by Petitioner in this proceeding (Paper 11). Based on our independent review of the ’420 claims and Specification, we agree with and adopt the reasoning and conclusion of the District Court that claim 13 should be corrected and rewritten as proposed by the Patent Owner and ordered by the District Court. Therefore, we consider claim 13 by twice replacing “hub” with –host— as shown in claim 13 as reproduced above. See Section I.D. (Challenged Claims) *supra*.

c. Claim 13¹⁵

A method of operating a USB hub module^[16] having a USB hub configured to be interconnected to a first USB port

¹⁵ In our analysis of claims 13 and 14, we incorporate into claims 13 and 14 the corrections discussed above (see Section II.C.3.b.) as does the showing in the Petition for claim 13 (see Pet. 60, 65).

¹⁶ The Federal Circuit has held that “module” is a well-known nonce word (*Rain Computing, Inc. v. Samsung Electronics America, Inc.*, 989 F.3d 1002, 1006 (Fed. Cir. 2021) and “simply a generic description of software or

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:

Petitioner does not take a position as to whether the preamble of claim 13 is limiting. Pet. 49 (“If limiting, Ground 1 satisfies the preamble.”). The Petition provides a showing that all the components recited in the preamble of claim 13 are taught by the cited art. *See* Pet. 49–58 (citing Ex. 1013 (Welch Decl.) ¶¶ 191–200, 224–244; Ex. 1014 (Chang) ¶¶ 16, 19–22, Figs. 1, 3, 5; Ex. 1015 (Chang II) ¶¶ 21, 24, 34, 37, 38, 40, Figs. 1, 5).

We also note that claims 1–6 of the ’420 patent that were challenged in IPR2024-00228 and found to be unpatentable are directed to a USB hub module including the components recited in the preamble of claim 13. *See* IPR2024-00228, Paper 57. As applicable to claim 13, we incorporate by reference herein the reasoning, findings, and conclusions set forth in the Final Written Decision (Paper 57) in IPR2024-00228.

Patent Owner does not address whether the preamble of claim 13 is limiting. *See generally* PO Resp.

On the current record, we need not determine if the preamble is limiting. Based upon our review of the entire record, we find that Petitioner

hardware that performs a specified function” (*Fintiv, Inc. v. PayPal Holdings, Inc.*, 134 F.4th 1377, 1382 (Fed. Cir. 2025)).

has demonstrated by a preponderance of the evidence that the cited art teaches all the elements recited in the preamble of claim 13.

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

Petitioner relies on Chang II (Ex. 1015) as disclosing this step. Pet. 58–59 (citing Ex. 1013 (Welch Decl.) ¶¶ 245–249; Ex. 1015 (Chang II) ¶¶ 13, 25–27, 38–40, 42–46, Figs. 5, 6). Petitioner points to the detection unit 134 depicted in Figure 5 of Chang II as making the recited determination (*id.* at 59) and paragraphs 38–40 of Chang II as “describ[ing] operational details of detection unit 134.” Paragraph 13 of Chang II provides:

[T]he detection unit 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 connected with the second connection interface, and a detection signal is produced accordingly, and the detection signal will be received by the CPU, and the CPU will accordingly control the second USB controller (host to host data transfer) or the bypass circuit unit (host to slave data transfer) for the appropriate operation.

Ex. 1015 ¶ 13. Paragraph 38 of Chang II provides:

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 the detection signal, and then according to the detection signal controls the operation of either the second USB controller 132 or the bypass circuit unit

133.

Id. at ¶ 38; *see also id.* at ¶¶ 26–27, 46.

Patent Owner relies on its argument (discussed and rejected above) that, in the proposed combination, the recited determination could not be made, because the “detection unit” would be disconnected from, and unable to communicate with, the attached consumer device. *See* PO Resp. 34–36. And, Patent Owner acknowledges that Chang II teaches “automatically detecting whether a host or a ‘slave’ USB device is connected.” PO Resp. 9. Patent Owner provides this description of Chang II’s relevant teachings:

Chang II’s “main feature” is providing two different transmission paths, automatically detecting whether a host or “slave” USB device is connected to the second connection interface, and selecting one of two different transmission paths between the first and second connection interfaces accordingly. (EX1015, [0021]; EX2019, ¶56.) Chang II’s control chip implements this feature via a process shown in FIG. 6:

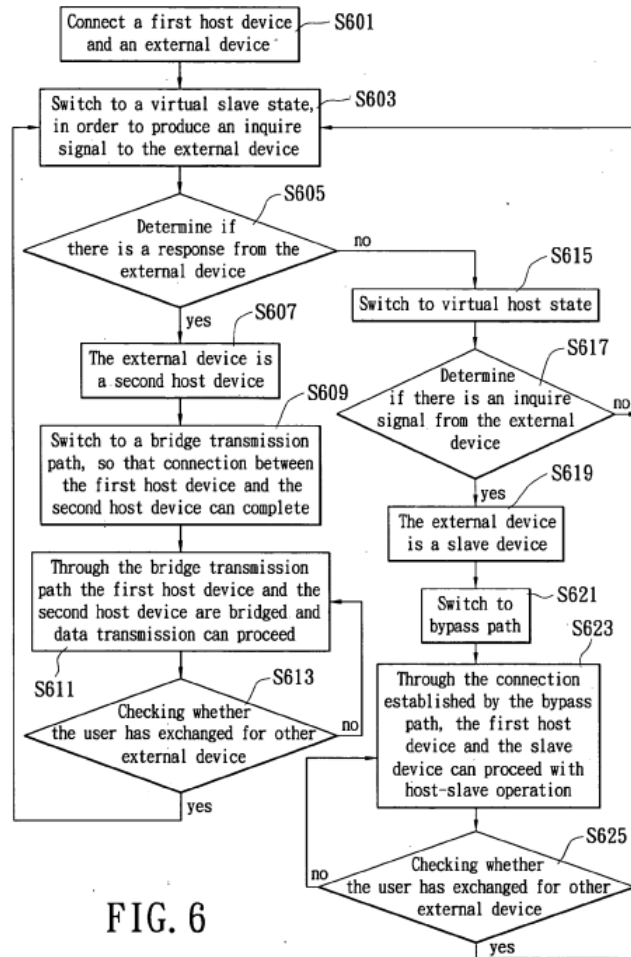


FIG. 6

(EX1015, [0023], [0042], FIG. 6; EX2019, ¶56.)

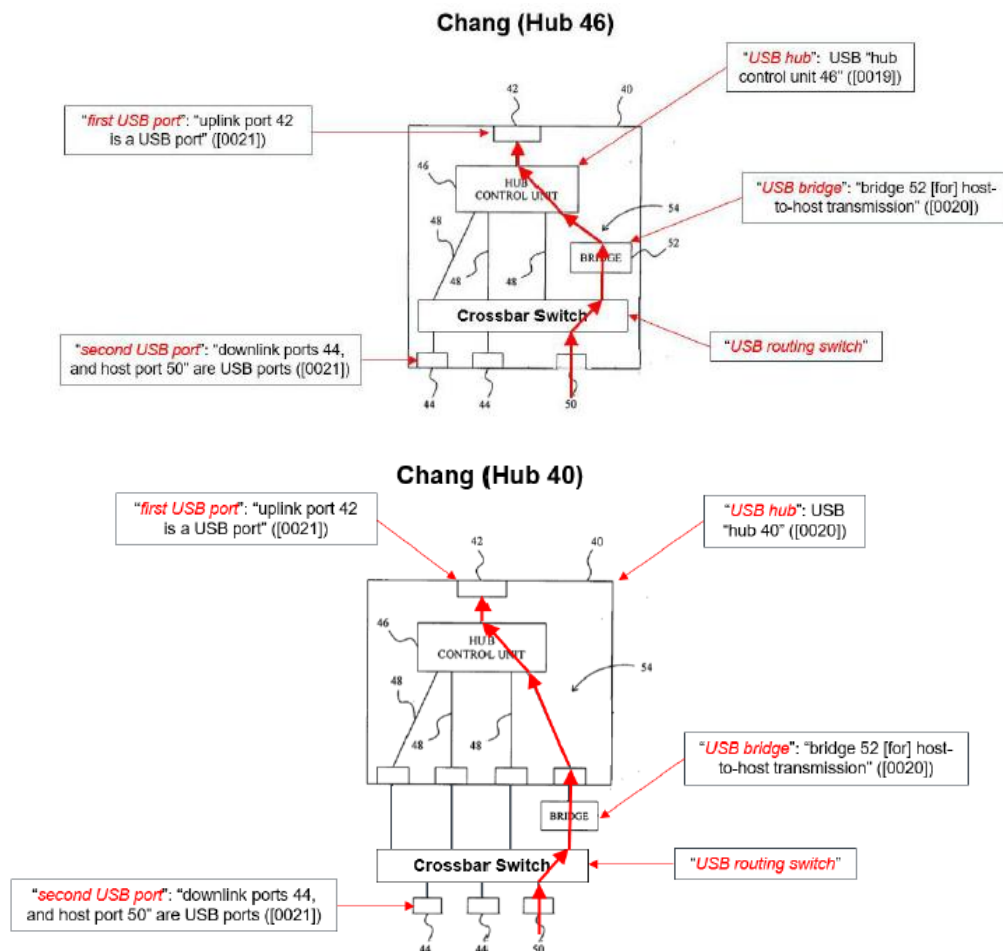
Id.

Based upon our review of the entire record, we find that Petitioner has demonstrated by a preponderance of the evidence that the cited art teaches this limitation.

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, 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

Petitioner contends that the recited language, “when the consumer device is determined to be in the USB host mode,” “refers to a USB product in host mode.” Pet. 60. Accordingly, Petitioner interprets this step as reciting making a host-to-host connection between a USB host connected to the first USB port and a consumer device connected to the second USB port also acting as a USB host. *See, e.g., id.* at 62 (providing modified and annotated versions of Ex. 1014 (Chang), Fig. 3 (reproduced below).



These figures from the Petition depict “red arrows show[ing] host-to-host communication paths . . . ‘connecting the consumer device via the second

USB port [e.g., port 50] to the USB [host] via the first USB port [port 42] through USB routing switch [crossbar] and the USB bridge [bridge] . . . when the consumer device is determined to be in the USB host mode.” *Id.* at 62–63 (first two alterations added; remaining alterations in original).

With regard to “*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,*” the Petition states that “the ‘routing switch’ accomplishes this by connecting the hosts through the ‘bridge’” (Pet. 63) and the “host-to-host communication is bi-directional communication because each host is a standard USB host that may initiate host communications (*id.* at 64 (citing Ex. 1013 (Welch Decl.) ¶¶ 256–257; Ex. 1014 (Chang) ¶ 20; Ex. 1015 (Chang II) ¶ 26)). Cited paragraph 20 of Chang provides:

[T]he hub 40 further comprises a host port 50 for being linked to a host, and a bridge 52 connected between the hub control unit 46 and host port 50. The bridge 52 **provides a function for host-to-host communications**, and may be implemented with a bridge chip for example OTi2108 of Ours Technology Inc. or other **host-to-host transmission chip**. With the hub control unit 46 and bridge 52, **a host-to-host transmission path 54 may be established** such that the uplink port 42 may communicate with the host port 50. As such, the host linked to the uplink port 42 can communicate with the host linked to the host port 50. The **host-to-host transmission mechanism** is a prior art, and is not described in detail hereof.

Ex. 1014 ¶ 20 (emphasis added). Cited paragraph 26 of Chang II provides:

Similarly, when a current user is connecting the second host device 3 with the second connection interface 12, and the control chip 13 is switched to the virtual slave device state for the second connection interface 12, there will also be an inquire signal produced by the control chip 13 to the second host device 3, then once the second host device 3 responses, by the

response confirmation can be made that the device connected to the second connection interface 12 is also a host, so that the control chip 13 will switch the transmission path to the bridge transmission path, in order to successfully complete the bridging between the first host device 2 and the second host device 3, so that **data transfer can proceed between the two host devices.**

Ex. 1015 ¶ 26 (emphasis added). These passages establish that both Chang and Chang II teach bi-directional host-to-host communication.

Patent Owner relies on its argument (discussed and rejected above) that, in the proposed combination, the recited connection could not be made, because the “detection unit” would be disconnected from, and unable to communicate with, the attached consumer device. See PO Resp. 36–38. And, in its Response, Patent Owner also cites to paragraph 20 of Chang and acknowledges:

Chang is a U.S. patent application that discloses a USB hub for implementing host-to-host USB transmission through a dedicated host port connected to a bridge. (EX1014, Abstract, [0020]; EX2019, ¶53.) Chang’s hub addresses the express goal of “easily establishing a connection between a computer and another computer.” (EX1014, [0003]; EX2019, ¶53.) In Chang’s hub, a USB host device (such as a computer) can connect to a dedicated host port (50), and communicate via a bridge (52) and hub control unit (46) to another USB host device—such as a second computer—connected to an uplink port (42). (EX1014, [0020]; EX2019, ¶53.)

PO Resp. 6–7. With regard to Chang II, Patent Owner acknowledges:

Chang II is a U.S. patent application that discloses a data transmission bridge device. (EX1015, Abstract.) The Chang II bridge device (1) has a first connection interface (11) and a second connection interface (12) connected by a control chip (13) in communication with a memory unit (14). (EX1015, [0023]; EX2019, ¶55.) The bridge device permits data

transmission between a first USB host device (2) connected to the first connection interface, and a second USB device connected to the second connection interface; the second USB device may be a device in a host mode (3) or a slave mode (4) (elsewhere referred to as a device mode). (EX1015, [0021]-[0022]; EX2019, ¶55.)

Id. at 8. And, Patent Owner further acknowledges with regard to Chang II:

[U]pon connection of an external device to the second connection interface (S601, S613, S625), a detection unit 134 of the control chip 13 switches to a virtual slave state (S603) and/or a virtual host state (S615), and detects a signal from the external device (S605, S617) on the second connection interface to determine whether the external device is a host device (S607) or a slave device (S619). (EX1015, [0042]-[0046], FIG. 6; EX2019, ¶57.) If the external device is a host device, a CPU 135 of the control chip switches the device to the first connection interface via a bridge transmission path, which includes a first USB controller 131, a buffer unit 136, and a second USB controller 132. (EX1015, [0023]; EX2019, ¶57.)

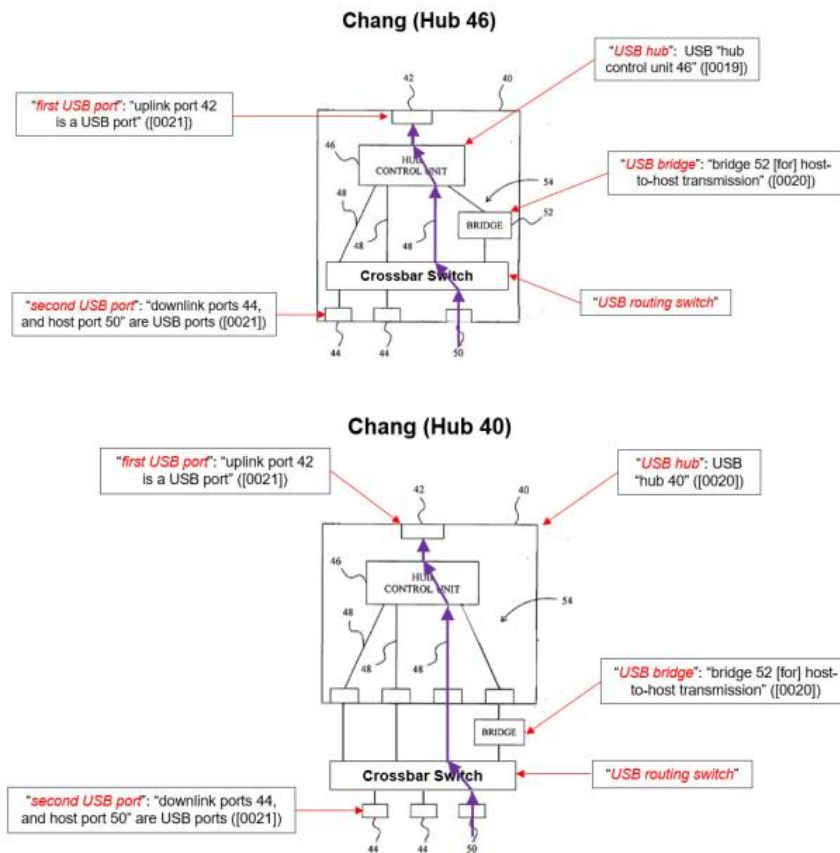
Id. at 10.

Based upon our review of the entire record, we find that Petitioner has demonstrated by a preponderance of the evidence that the cited art teaches this limitation.

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 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.

Petitioner contends that this step “pertains to system operation when the consumer product is in the device mode.” Pet. 65–66. Accordingly, Petitioner interprets this step as “requir[ing] a host-to-device connection

between upstream host and downstream consumer product (in device mode), where the signal/connection path traverses the ‘second USB port,’ ‘routing switch,’ ‘hub,’ and ‘first USB port,” but ‘bypass[es] the USB bridge.’” *Id.* at 66 (second alteration in original). The Petition includes a showing that all the elements of this step are taught by the cited art. *Id.* at 65–69 (citing Ex. 1013 (Welsh Decl.) ¶¶ 261–266; Ex. 1014 (Chang) ¶¶ 19, 20, 23, Fig. 3; Ex. 1015 (Chang II) ¶ 30, Fig. 1). The Petition also provides modified and annotated versions of Ex. 1014 (Chang), Fig. 3 (reproduced below). *Id.* at 68.



These figures from the Petition depict “a host-device connection (purple arrows) between the first/upstream and second/downstream ports which *‘bypass[es] the USB bridge.’*” *Id.* at 67 (alteration in original).

With regard to “only respond[ing] to communication initiated by the USB host,” the Petition states that “[t]his is traditional USB host/device operation and it was well-known USB devices only respond to host communication.” *Id.* at 69 (citations omitted). Moreover, the “Background” section of the ’420 patent in describing how USB systems historically operate states:

USB protocols require a point-to-point connection in which one end is the USB Host or master, and the other end is a USB Device or slave. In this way, the flow of messages between the

two devices is managed and controlled, whereby the USB Device responds to messages initiated by the USB Host.

Ex. 1003, 1:33–38. And, Patent Owner acknowledges:

The Chang hub also comprises a number of downlink ports (44) for linking devices connected to the downlink ports to the uplink port. (EX1014, [0019]; EX2019, ¶54.) The downlink ports allow for host-to-device transmission between USB devices (in a device mode) connected to the downlink ports and a host device connected to the uplink port. (EX1014, [0019]; EX2019, ¶54.)

PO Resp. 7. With regard to Chang II, Patent Owner acknowledges that it teaches a process (the flow chart of Figure 6) in which a consumer device operating in a USB device mode is connected through a bypass path (steps S619, S621, and S623). *Id.* at 9–11.

Based upon our review of the entire record, we find that Petitioner has demonstrated by a preponderance of the evidence that the cited art teaches this step and all the limitations of claim 13.

d. Claim 14

The method according to claim 13, wherein the step of determining if when^[17] the consumer device is operating in the

¹⁷ The Petition states that “[i]t is unclear whether ‘*determining if when*’ means ‘determining if’ or ‘determining when,’ but Ground 1 satisfies both interpretations.” Pet. 69 n.20. Patent Owner does not address this language in claim 14. *See generally* PO Resp. As neither party raises any issue regarding this language, we do not consider how “if when” in the context of claim 14 should be construed or whether claim 14 is indefinite.

USB host mode or in the USB device mode is performed by the USB routing switch.

Ex. 1003, 10:62–65. To meet the additional limitation of claim 14, Petitioner proposes combining the host/device determination functionality and the USB routing switch on one integrated circuit (IC). Pet. 69–70. The Petition states:

[B]oth Crossbar Implementations render obvious a USB routing switch and determining a downstream product’s host/device mode (*e.g.*, via signal detection circuitry). It would further have been obvious to include this functionality on one IC. Welch, ¶¶267-274. First, Chang expressly teaches integrating multiple components onto one IC. EX1014, [0022]. Second, Chang II discloses switching functionality and detection circuitry on one control chip. EX1015, Fig. 2 (showing “control chip 13” implemented on single chip), Fig. 5 (“Detection Unit 134” and “Bypass Circuit Unit 133”). Third, including these elements on a common IC was well-known. *See, e.g.*, EX1071 (mux chip with detection circuitry); EX1017 (“crossbar switch” on same SoC (System-on-Chip) as detection circuitry (OTG controller for host device negotiation), [0046] (OTG controller), [0057] (crossbar switch), [0063] (SoC), [0070] (SoC).

A POSITA would have been motivated to include these components on the same device or chip because it was well-known that doing so reduced size/footprint and lowered manufacturing and assembly costs. Welch, ¶273. Indeed, because the detection circuitry typically receives the signals from the downstream USB port for detection, co-locating the detection circuitry with the switching circuitry is common sense. *Id.*

Id. at 70–71 (bracketed material in original).

Patent Owner challenges the showing as to the additional limitation recited in claim 14. *See* PO Resp. 38–40. Patent Owner argues:

To show that the “determining” limitation is performed by the USB routing switch, Petitioner speculates that it would have been obvious for the proposed combination to feature a

single integrated circuit (IC) including both the alleged USB routing switch (*i.e.*, the crossbar) and the detection unit 134 of Chang II, which is alleged to meet the “determining” limitation. (Petition, 69-71, 58-59; EX2019, ¶105.)

This fails to show that claim 14 is met. (EX2019, ¶106.) First, the Petition points to no evidence of a single IC that includes both detection unit 134 and the crossbar relied upon by the Petition. (EX2019, ¶106.) Instead, the Petition apparently contends the POSITA would have known to design a custom IC, speculating that the POSITA “would have known how to easily do so,” and that it would have been “common sense.” (Petition, 69-71; EX2019, ¶106.)

But IC design is a complex field posing non-trivial technical challenges, and requiring specific electronic design expertise. (EX2019, ¶107.) These complexities are overlooked by the Petition, which fails to explain in any detail how the POSITA would have been able to combine the crossbar and detection unit 134 into a single IC, and to incorporate that IC into the proposed combination, with any reasonable expectation of success. This is particularly so given the level of skill in the art, which under either party’s formulation does not include any IC design experience. (*See supra* Section III; Petition, 22-23; EX2019, ¶107.) Moreover, as the Federal Circuit has explained, the Petition’s appeal to “common sense” to supply missing claim limitations is proper only if supported by evidence and a reasoned explanation—both absent here. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016).

Id. at 38–39.

We determine that Petitioner has the better position. Patent Owner does not dispute that “signal detection circuits for this purpose were well-known” as alleged by Petitioner (Pet. 69 (citing Ex. 1013 ¶ 268; Ex. 1015, ¶¶ 38–40, Fig. 5 (“Detection Unit 134”))). And, the ’420 patent recognizes “the cost and size” advantages of combining components on an integrated circuit (IC) and recognizes this as a design choice. *See* Ex. 1003, 7:11–25. The ’420 patent provides:

FIG. 5 illustrates an alternative embodiment wherein the switching device comprises USB routing logic, and both the USB routing logic and the USB Bridge are integrated with the USB Hub in a combination USB Hub/USB Bridge Integrated Circuit (IC). This configuration has cost and size advantages over building it with discrete components connected together on a printed circuit board.

FIG. 6 illustrates the internal components of the USB Hub/USB Bridge Integrated Circuit (IC) shown in FIG. 5. As shown, preferably the components of the USB Bridge include a bridge controller as well as endpoint buffers. While the exact configuration of endpoints is effectively up to the system designer to choose for a particular need, a specific example of one possible endpoint configuration is shown in FIG. 7; however, many others are possible.

Id.

Based upon our review of the entire record, we find that Petitioner has demonstrated by a preponderance of the evidence that the additional limitation in claim 14 is taught or suggested by the cited art.

e. Motivation to Combine

With regard to combining the teachings of Chang and Chang II, Petitioner argues:

Chang discloses a hub with dedicated downstream device ports (for host-device connections) and a dedicated downstream host port (for a host-host connection through a bridge). It would have been obvious to modify Chang in view of Chang II and a

POSITA's knowledge to include dual-role port(s)^[18] and a switch to route the ports to the appropriate transmission path. Pet. 36–37 (citing Ex. 1013 ¶¶ 175–202). Patent Owner challenges Petitioner's showing on motivation to combine. See PO Resp. 54–63.

With regard to motivation to modify Chang to include dual-role ports, Petitioner contends that “[a]s the ’420 patent admits, consumer products (*e.g.*, smartphones and other mobile device[s]) with dual-role capabilities were gaining popularity before the 2013 priority date” and “it would be impractical, and inconvenient at best, to require consumers to understand when to switch connections between host- and device-ports when using a dual-role product.” Pet. 37. Thus, according to Petitioner, “a POSITA would have been motivated to combine Chang's dedicated device- and host-ports to create one or more dual-role ports.” *Id.* at 37 (citing Ex. 1013 (Welch Decl.) ¶ 177). The Specification of the ’420 patent provides support for this argument in this passage:

[L]eading mobile device manufacturers and system designers have begun designing their mobile device products (*i.e.* smart phones, tablets, etc.) to support both USB Host and USB Device roles. In other words, the phone may configure itself such that it can function as a USB Device when it needs to be, or as a USB Host when it needs to be.

Ex. 1003, 2:56–62. We determine that this contention seems reasonable in view of the market demands acknowledged in the Specification. *KSR*, 550 U.S. at 418 (“Often it will be necessary for a court to look to . . . the effects

¹⁸ Petitioner describes a dual-role port as “a port supporting products that could operate in either a host or device mode.” Pet. 2. Patent Owner describes dual-role ports as “ports designed to accommodate a device regardless of whether it was operating in device or host mode.” Prelim. Resp. 33 (citing Ex. 2001 ¶ 46).

of demands known to the design community or present in the marketplace . . . to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.”).

Petitioner also contends that “modifying Chang to include dual-role ports would further its express goal of ‘easily establishing a connection between a computer and another computer.’” Pet. 38 (citing Ex. 1014 ¶ 3). And, Petitioner relies on the acknowledgement in the ’420 patent that “prior art smartphones dynamically operated as either device or host, with host operation resulting from the fact that smartphones had effectively become personal computers.” *Id.* (citing Ex. 1003, 2:40–46). The Petition states:

[A] POSITA would have been motivated to include dual-role port(s) to further Chang’s goal of connecting the upstream computer to the downstream phone acting as a computer. Welch, ¶178. Specifically, dual-role ports would allow consumer products, such as smartphones, that operate as computers (in host mode) to “easily establish[] a connection” (EX1014, [0005]) to the upstream host; the smartphone would plug into the dual-role port and automatically connect to the upstream host (through the bridge) when the smart phone switches to host mode . . . without requiring the user to switch between dedicated host- and device-ports. Welch, ¶¶178-179.

Id. According to Petitioner with supporting testimony of its declarant, “[t]his avoids the inconvenience, hassle, and confusion of consumers having to keep track of (1) what mode their phone is operating in and (2) what mode(s) are supported by individual hub ports.” *Id.* (citing Ex. 1013 (Welch Decl.) ¶ 179). Here again, we determine that this reasoning provides rational underpinning, supported by evidence, that a skilled artisan would

have been motivated to modify the USB hub module of Chang to include dual-role ports as described in Chang II.

And, Petitioner still further contends that “[o]ne common-sense reason it was desirable and obvious to a POSITA to make all downstream ports dual-role is user convenience (viz., users need not know or recall which port to use for host-mode operation or keep track of whether their product is in device- or host-mode)” (Pet. 43 (citing Ex. 1013 ¶ 179)) and “[m]oreover, it was well-known and obvious to include multiple dual-role hub ports” (id. (citing Ex. 1013 ¶¶ 195–197)). In support of the contention that including dual-role hub ports was well-known and obvious, Petitioner cites two references. *Id.* at 43–44 (citing Ex. 1016 ¶¶ 5, 24, 27 (products on ports may act as device or host), Fig. 2 (depicting five ports); Ex. 1017 ¶¶ 55–56 (ports support host and device modes), Fig. 6)).¹⁹ We determine that this reasoning also supports with evidence modifying Chang to include dual-role ports as taught by Chang II.

Petitioner contends that “[a] POSITA would have had a high expectation of success in modifying Chang to include dual-role ports.” Pet. 39. In support of this contention, Petitioner argues:

[D]ual-role ports (viz., interfaces for connecting dual-role products) and host/device detection were already well-known, and merely involved using commercially available components and well-understood signaling. *See also* EX1025, 3:10-32, 3:40-4:8, 7:34-40; EX1052, 3:21-50. Again, the ’420 patent

¹⁹ Exhibit 1016 also discloses a “port switching device” attached to its multiple ports (see Pet. 43) and Exhibit 1017 also discloses a “Port Router” attached to its multiple ports (see Pet. 44 (Exhibit 1017 “discloses that ‘Port Router’ may be a ‘crossbar switch for assigning each physical port to the respective port handler.’”))).

admits several solutions for supporting dual-role ports in USB systems were readily available. EX1005, 3:21-59; *see also* Welch, ¶183.

Id. And, Petitioner also argues:

A POSITA would have been motivated to implement each of Chang’s downstream consumer ports as dual-role ports with a high expectation of success. Indeed, the typical consumer product was often a dual-role product, the implementation was well-known and routine, and doing so reduced the cost and footprint of the hub and was more convenient to the user.

Pet. 45 (citing Ex. 1013, ¶¶ 69–73, 194–199).

With regard the motivation to modify Chang to include a switch to route the transmissions to and from a device attached to a downstream port through an appropriate transmission path to and from the upstream port with an attached host device, Petitioner relies on similar arguments and reasoning. The Petition states that “[w]hen multiple ports are dual-mode, it was well-known and it would have been obvious to a POSITA to include basic switching functionality to route each port to the appropriate transmission path.” Pet. 44.

Petitioner contends that “[a] POSITA would have recognized that Chang effectively provides a roadmap to implement switching to support dual-role ports.” Pet. 39. In support of this contention, Petitioner points to Chang’s teachings of “separate transmission paths for host-to-host (‘host-to-host transmission path 54’) and host-to-device connections (‘transmission paths 48’)” (*id.* at 39–40 (citing Ex. 1014 ¶¶ 19–20, Fig. 3) and Chang II’s teachings of “switching functionality to select the appropriate transmission path depending on the consumer product operating mode, e.g., ‘host-to-host transmission path 54’ or ‘transmission paths 48’” (*see id.* at 40; Ex. 1015

¶¶ 2, 11, 21, 24). Petitioner also contends that “switching transmission paths was highly predictable, being well-known and routine to implement using readily available off-the-shelf components.” Pet. 57 (citing Ex. 1013 ¶¶ 237–238; Ex. 1059, Ex. 1060, Ex. 1063, 7–8; Ex. 1068 (2); *see also* Ex. 1017 ¶ 57, Fig. 1; Ex. 1040, 4:39–5:29; Ex. 1041, 1:20–36; Ex. 1052, 3:7–20, Fig. 1; Ex. 1053 ¶¶ 31–34, Fig. 1; Ex. 1055, 284–288). Based on this reasoning and evidence, Petitioner argues that:

Accordingly, in the context of Chang, a POSITA would have been motivated to implement dual-role ports by including a switch (e.g., multiplexer or crossbar) that connects the dual-role port(s) directly to the hub’s upstream port (when the consumer product is configured as a device, i.e., path 48) or to the hub through the bridge (when the consumer product is configured as host, i.e., path 54).

Id. at 40–41 (citing Ex. 1013 ¶¶ 182–187). Petitioner’s argument that a skilled artisan would have been motivated to modify Chang to include switching functionality as taught by Chang II and supported by other substantial evidence appears well-reasoned and well-supported.

Petitioner argues that “[a] POSITA would have been further motivated to improve Chang in view of Chang II, because Chang II expressly states its relevance to USB hubs.” Pet. 41 (citing Ex. 1013 ¶ 181; Ex. 1015 ¶¶ 27, 40). And, Petitioner argues that “while Chang discloses little regarding its bridge (EX1014, [0020]), Chang II details various aspects of its bridge (EX1015, Title, Figs. 1-2 and 5).” *Id.* In support of this argument, the Petition provides:

Importantly, Chang II further details exemplary switching for either a host- or device-product: “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.” EX1015, [0021]. In other words, Chang II describes “switch[ing]” to connect a “bridge” transmission path (when the product is host) or “bypass” path (when the 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].

Id. (bracketed material in original, footnote omitted). Petitioner contends that “[a]ccordingly, 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.” *Id.* at 41–42. We determine that this contention is well-reasoned and well-supported.

Patent Owner challenges on several grounds the showing regarding the motivation to combine the relevant teachings of Chang and Chang II. PO Resp. 54–63. Patent Owner argues that “the Petition’s proposed combination . . . relies on hindsight reconstruction—a process employed by Petitioner’s expert.” *Id.* at 54 (citing Ex. 2021, 9:15–10:10, 64:24–65:17). The cited testimony does not establish that the Petition or Petitioner’s expert relied on hindsight reconstruction. In the first passage (Ex. 2021, 9:15–10:10), Petitioner’s expert, Mr. Welch, testified that he “start[ed] with and focus[ed] on the language of the patents in question;” that the first thing that he did was read the patents and read the claims; and that his “analysis started with the claims of the patents.”²⁰ In the second passage (Ex. 2021, 64:24–65:17), Petitioner’s expert again testified that he started his analysis with the patent and the claims and then he looked at the cited art, Chang and Chang

²⁰ The witness refers to “patents” because his testimony related to five pending *inter partes* reviews (see Ex. 2021, 1 (caption)) challenging claims in four of Patent Owner’s patents. See Section I.B. (Related Matters).

II, to “see whether they taught or made obvious what was in the claims.”

This criticism of the Petition and Petitioner’s expert is not valid.

Mr. Welch’s process of first focusing on the patent and the claims and then looking at the prior art was quite reasonable and logical. We determine that Petitioner and its expert have not relied on impermissible hindsight based on this evidence. Petitioner responds to this argument with:

P[atent]O[wner] also argues hindsight because Mr. Welch read the patent before the prior art. POR, 54-55. Experts routinely do this to assess if they are comfort/qualifications in the patented subject matter and has nothing to do with hindsight. Moreover, P[atent]O[wner]’s own expert follows the same approach P[atent]O[wner] criticizes. EX1084, 28:12-29:23.

Pet. Reply 23. It does appear that Petitioner’s and Patent Owner’s declarants both started with reviewing the patents and the claims and then looked at the prior art. We do not believe this was improper or contrary to the law of obviousness.

Patent Owner argues that “[t]his hindsight analysis improperly fails to consider evidence of how the POSITA would not have been motivated to make the proposed combination.” PO Resp. 55. However, as shown above, Petitioner (and its declarant, Mr. Welch) provide several well-articulated reasons that are well-supported by cited evidence to establish that a skilled artisan would have been motivated to make the combination of teachings alleged in the Petition. Nonetheless, in considering motivation to combine and obviousness, we take care to avoid “the distortion caused by hindsight bias and” are “cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421.

Patent Owner also relies upon its argument discussed above (*see* Section II.E.3.a.) that Petitioner’s combination would be inoperable. PO Resp. 56 (“But, as described above, the Petition’s proposed combination would be unable to ‘automatically detect’ the type of device once the hub module has been placed in the device mode, and to switch to the appropriate transmission path accordingly (*e.g.*, from a device mode back to a host mode.”). Petitioner responds that Patent Owner’s attack on its combination “relies on the false premise of *replacing* Chang’s bridge 52 with Chang II.” Pet. Reply 23. We agree with Petitioner and reject this argument for the reasons discussed above. *See* Section II.E.3.a.

Patent Owner also argues that “the proposed combination would introduce unnecessary complexity, redundancy, and additional costs.” PO Resp. 59 (capitalization and bolding removed from heading). Here again, Patent Owner bases these contentions on a mischaracterization of the proposed combination of teachings of the cited references. *See id.* at 59–63. Petitioner counters, “But Petitioner ‘appl[ied] Chang II’s teachings and [POSITA’s knowledge]’ to Chang, not bodily incorporation.” Pet. Reply 23–24 (alterations in original). Modifying Chang to include dual-role ports and a USB router switch would have added steps and components, but also would have increased the usefulness and provided benefits to the Chang system. As discussed above, Petitioner, and its expert declarant, articulate well-supported reasoning as to why the proposed modifications to Chang, based on teachings in Chang II, would increase usefulness and provide benefits. *See* Pet. 36–48. Even if modifying Chang as proposed would have somewhat complicated Chang’s design, “precedent . . . does not require that the motivation be the *best* option, only that it be a *suitable* option from

which the prior art did not teach away.” *PAR Pharm., Inc. v. TWI Pharmas., Inc.*, 773 F.3d 1186, 1197–1198 (Fed. Cir. 2014) (emphasis in original). We have considered these arguments and we determine that Petitioner’s proposed modifications to Chang (dual-role ports and a USB routing switch) would not have been “wasteful and inefficient” as contended by Patent Owner. See PO Resp. 59.

In summary, we give much more weight to Petitioner’s substantial argument and evidence relating to motivation to combine than Patent Owner’s contrary weak and insubstantial argument and evidence.

f. Secondary Considerations of Non-Obviousness

Patent Owner argues that “numerous secondary considerations of non-obviousness further support that the claims are patentable.” PO Resp. 3. Petitioner counters that “[Patent Owner]’s secondary considerations fail collectively for lack of nexus, and individually on the merits” and “[e]ven if credited, [Patent Owner]’s secondary considerations cannot overcome Petitioner’s strong *prima facie* obviousness case.” Pet. Reply 2.

When presented, secondary considerations “must always . . . be considered in the overall obviousness analysis.” *Adapt Pharma Operations Ltd. v. Teva Pharms. USA, Inc.*, 25 F.4th 1354, 1372 (Fed. Cir. 2022). However, “a strong showing of obviousness may stand even in the face of considerable evidence of [secondary considerations].” *Id.* Based on the evidence of record and findings discussed above, we determine that any evidence of secondary considerations would need to be given substantial

weight in order to determine that claims 13 and 14 have not been shown to be unpatentable by a preponderance of the evidence.

In order for secondary considerations to be awarded “substantial weight” “in an obviousness analysis,” the Federal Circuit has advised that the “secondary considerations must have a nexus to the claims.” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (internal quotations omitted). The Federal Circuit has further instructed that “[t]he patentee bears the burden of showing that a nexus exists.” *Id.* (quoting *WMS Gaming Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999)). Finally, the Federal Circuit instructs that “[t]o determine whether the patentee has met that burden, we consider the correspondence between the objective evidence and the claim scope.” *Id.* (quoting *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019)).

Petitioner challenges Patent Owner’s showing as to nexus between the claimed invention and the evidence relating to secondary considerations.

Pet. Reply 25–27. With regard to nexus, Patent Owner’s Response provides:

In the present case, the challenged claims are tied to [Patent Owner]’s commercial “dual-role hub” containing its Boston-2 chip. The combination of a host-to-host USB bridge with USB routing switches allowed the dual role hub to provide CarPlay support on each downstream port without the need for a second upstream connection with the head unit and without interrupting USB connectivity on the non-CarPlay downstream ports. (EX2042, 201:19-202:10-13.) It was therefore the specific arrangement claimed in the patent that provided a solution to the “vexing problem” facing automakers and their suppliers and which ultimately drove demand for [Patent Owner]’s product. (*Id.*, 202:14-22.) As a result, [Patent Owner] is both entitled to a presumption of nexus between the claims and the dual-role hub and has independently established that the secondary considerations are the “direct result of the

unique characteristics of the claimed invention”—particularly as to **claims 19 and 20** of the ’420 Patent, which are directly tied to the persistent downstream USB connectivity desired by automakers.

The requisite nexus between the claimed invention and [Patent Owner]’s product is supported by the chart below, which demonstrates on a per-limitation basis how [Patent Owner]’s Dual Role Hub meets all limitations of exemplary **claims 19 & 20**. It is further supported by the Supplemental Declaration of Dr. Houh, (EX2019, ¶¶ 158–160.)

PO Resp. 80–81 (emphasis added). Although in the first sentence quoted above, Patent Owner refers to the “challenged claims,” Patent Owner’s argument and evidence relating to nexus is limited to claims 18–20. *See* PO Resp. 80–96; *see also* Ex. 2019 ¶ 158 (“Provided below is a chart illustrating, on a per-limitation basis, how [Patent Owner]’s Dual Role Hub meets all limitations of at least **claims 18, 19, and 20.**”) (emphasis added). And, the evidence cited is weak and does not support the conclusions drawn from it.

Specifically, with regard to the evidence cited, Patent Owner cites to testimony but, in the Response, fails to identify the witness or the proceeding in which the testimony was given. And, the cited testimony provides no indication that this unidentified witness is discussing Patent Owner’s “commercial ‘dual-role hub’ containing its Boston-2 chip.” And, there is no testimony that any of Patent Owner’s products included a “host-to-host USB bridge,” “a USB routing switch,” or “the specific arrangement claimed in the [’420] patent.” *Id.*

The only other evidence cited by Patent Owner in support of its nexus contention is from the Supplemental Declaration of Dr. Houh. *See* PO Resp. 81 (citing Ex. 2019 ¶ 158–160). The cited paragraphs are limited to

providing an analysis of only claims 18–20 of the ’420 patent. *See* Ex. 2019, 158–160. Moreover, Dr. Houh supports his testimony with documentation (Exhibits 2022, 2023, 2024, 2037 (*see* Pet. 82–96)) with no showing or explanation that the cited documentation relates to any of Patent Owner’s products.²¹ Because Patent Owner fails to provide sufficient, persuasive evidence that any of its products are the invention claimed in the challenged claims of the ’420 patent or that “the secondary considerations are the ‘direct result of the unique characteristics of the claimed invention’” (*see* PO Resp. 80), we reject Patent Owner’s contention that it is entitled to a presumption of nexus or has shown a nexus between its secondary considerations evidence and the claimed invention.

With regard to evidence of secondary considerations, Patent Owner argues that there existed “long-felt but unsolved needs.” PO Resp. 64–69. Petitioner counters that there was no long felt need. Pet. Reply 27–28. Petitioner argues that Patent Owner ties the alleged need to Apple CarPlay that “was announced in 2013 . . . mere months before the ’420 [patent’s] priority date” and “[t]hat is the opposite of long-felt need.” *Id.* at 28. We find that Patent Owner fails to establish that there existed a long felt but unsatisfied need for the invention claimed in the ’420 patent. Not only does Patent Owner fail to make a showing that there was any need that was long felt but Patent Owner also fails to show that the alleged need was for the claimed invention. *See* PO Resp. 62–69.

²¹ Patent Owner’s declarant, Dr. Houh, rendered no opinion as to whether the alleged evidence of secondary considerations overcame the alleged showing of obviousness in the Petition. *See* Ex. 1084, 53:23–56:5.

Patent Owner argues “[f]ailure of others/skepticism of skilled artisans.” PO Resp. 69–72 (capitalization and bolding removed from heading). Patent Owner presents evidence that, in 2014, Petitioner’s employees expressed doubt that a USB system could accommodate more than one USB host and were skeptical that Patent Owner had found a way to accommodate attaching a second host (such as an Apple phone) to a USB system. *See id.* Petitioner blames Apple for telling Petitioner that “it would not allow a bridge” and telling Patent Owner “that using a bridge was likely ‘fine.’” Pet. Reply 30. Although Patent Owner’s evidence is weak with regard to the relationship between the alleged failure and skepticism and the claimed invention, we give some weight to Patent Owner’s argument and these secondary consideration factors in our overall consideration of obviousness. It does appear that Patent Owner succeeded where Petitioner for at least some time failed and Petitioner’s employees were skeptical about Patent Owner’s solution.

Patent Owner alleges commercial success. PO Resp. 72–73. Patent Owner presents evidence that it won business from the Big 3 (GM, Chrysler, and Ford) US auto manufacturers. *Id.* at 72. Patent Owner argues:

Despite initial concerns about [Patent Owner]’s ability to ramp up manufacturing to meet demand, the Big 3 quickly switched from [Petitioner] to [Patent Owner] to source for upcoming model year products. (EX2040, at 229:14-19; EX2037, 13.) Altogether, [Patent Owner] captured 40% of the global Big 3 offerings for model year 2016, representing 10 million units. *Id.* Ultimately, [Patent Owner] sold approximately 45 million units between 2015 and November 2021. (EX2041, 281:12-22.) This was an unquestionable commercial success for a new product launch in the automotive industry. (EX2036, ¶10.)

Id.

Petitioner claims that Patent Owner has failed to show that any alleged commercial success was due to factors related to the claimed invention. Pet. Reply 28–29. Petitioner argues:

P[atent] O[wner] ignores other sales considerations like Apple’s brand name, lower pricing (EX2040, 233:4-12), marketing, cosmetics (EX2042, 182:10-23), etc. Apple’s certification and brand name (as perhaps the most recognized company on the planet) cannot be ignored.

Significantly, P[atent] O[wner] benefited from a head start due to early, insider access to Apple’s confidential CarPlay requirements through the Jaguar car company. *E.g.*, EX2003, 109:6-12, 157:6-15, 149:12-22 (CarPlay “not publicly known”), 108:13-109:10-12 (“Jaguar was talking to Apple...start[ed] feeding us some ... requirements.”).

Id. As discussed above, we determine that any alleged commercial success secondary consideration evidence has not been established to have a nexus to the claimed invention. Accordingly, we consider the evidence of commercial success but accord it little weight in our overall obviousness determination.

Patent Owner also argues that it “achieved significant acclaim within the automobile industry for its dual role hub.” PO Resp. 73. Patent Owner argues, “[m]ost notably, it was the winner of the 2016 PACE Award, an industry honor awarded by Automotive News.” *Id.* at 73–74 (citing Ex. 2036 ¶ 4). For evidence as to this award, Patent Owner relies primarily on the Declaration of Michael Dreon (Ex. 2036). *See id.* at 73–75. Particularly, Patent Owner relies on the Dreon Declaration in an attempt to show that the award was linked to the invention claimed in the ’420 patent. *Id.* at 74 (citing Ex. 2036 ¶ 9). The cited paragraph in the Dreon Declaration states:

“Based on my conversations with the judges, as well as from the judge’s citation and award video, it is my understanding that the feature driving their selection of the dual-role hub was its ability to allow persistent downstream USB connectivity to non-CarPlay devices while CarPlay was active without altering the head unit hardware to add a second upstream connection.”

Ex. 2036 ¶ 9. As will be appreciated from this testimony, it is based on hearsay and the witness does not establish that he has any first-hand knowledge of the reason for the award. Petitioner argues:

P[atent]O[wner] cites a single “Automotive News” award (from a non-USB body) touting CarPlay compatibility. POR, 74-75. The dozen-plus “winners” included “Cover Carving Technology for seats” and “Electronic oil pump.” See www.autonews.com/awards/pace/2016/. P[atent]O[wner] self-nominated for the award (EX2036, ¶6) and hosted judges for “site tours” and “lunches” (EX2037, 2). P[atent]O[wner]’s declarant (Mr. Dreon) cites inadmissible hearsay based on purported “conversations with the judges” regarding why [Patent Owner] won. EX2036, ¶9. The PACE article mentions other reasons (*e.g.*, “lower cost”). www.autonews.com/awards/2016-winner-delphi-automotive-dual-role-hub. This is not “objective evidence” establishing nonobviousness.

Pet. Reply 27. Petitioner’s criticism of this purported evidence of industry praise has merit. We determine that Patent Owner’s argument is based on hearsay and should not be considered. However, even if considered, this evidence of purported industry praise is entitled to little weight.

Patent Owner further alleges that Petitioner copied its product. PO Resp. 75–80. As evidence that Petitioner copied its product, Patent Owner argues that Petitioner “obtained one of [Patent Owner]’s chips from a competitor and analyzed it to understand its capabilities.” *Id.* at 78 (citing

Ex. 2040, 186:22–188:12). Patent Owner claims that Petitioner introduced its product “[s]everal years later.” *Id.* at 79. Petitioner presents evidence that Patent Owner has this timing wrong. Pet. Reply 30. Petitioner argues:

Moreover, P[atent] O[wner]’s insinuation [Petitioner] copied [Patent Owner] because it “obtained...and analyzed [an [Patent Owner] product]” is baseless. POR, 78-79. The alleged activity was done in “July of 2016” as pre-suit investigation before suing [Patent Owner], **after** [Petitioner] “finished [its] device and [was] making it available [for customer testing].” EX2040, 125:9-126:16.

Id. Petitioner’s argument is supported by the cited evidence. Patent Owner’s purported evidence of alleged copying by Petitioner is entitled to little or no weight because it is not well-supported.

g. Summary as to Claims 13 and 14

Petitioner has persuasively shown that the combination of Chang and Chang II teaches or suggests all the limitations of claims 13 and 14 and has articulated well-supported reasoning as to why a skilled artisan would have been motivated to combine the relied-upon teachings of Chang and Chang II. Based upon our review of the entire record, we conclude that Petitioner has demonstrated the unpatentability of challenged claims 13 and 14 of the ’420 patent by a preponderance of the evidence.

4. Claims 18–20

Petitioner also challenges claims 18–20 of the ’420 patent as obvious in view of Chang and Chang II. Pet. 4. Claim 18 is independent; claim 19 depends from claim 18; and claim 20 depends from claim 19. Ex. 1003, 12:7–47. Claim 18 recites, “[a] communication system, comprising a USB hub **including** a first USB port and a second USB port” (*id.* at 12:7–9 (emphasis added)) and claim 19 recites, “the USB hub **includes** a third USB

port” (*id.* at 12:34 (emphasis added)). In the Petition, it is argued that the Board should adopt changes to claims 18 and 19 that the Patent Owner proposed in District Court litigation in which “including” in claim 18 is changed to --interconnected to-- and in which “includes” in claim 19 is changed to --is interconnected to--. *See* Pet. 25–28. Petitioner adopts these changes in its unpatentability contentions (*see id.* at 27, 73, 85) and does not contend that claims 18–20 are unpatentable if these changes are not adopted. *See id.* (“Petitioner does not contend the Ground herein renders the Challenged Claims unpatentable under the plain and ordinary meaning.”). We do not adopt the proposed changes to claims 18 and 19 and determine that claims 18–20 have not been established to be unpatentable.

a. The Alleged Errors in Claims 18 and 19

i. The Record Relating to the Alleged Errors is Undeveloped

There exists no support in the record of this proceeding for changing the language of claims 18 and 19. In the Petition, although Petitioner proposes that we adopt changes to claims 18 and 19 that the Patent Owner argued for in District Court litigation, Petitioner provides no argument or reasoning supporting these changes. *See* Pet. 25–28. Instead, the Petition relies on an assertion made by Patent Owner before the District Court as to what “‘a POSA would understand from the surrounding claim language and patent specification’” (*id.* at 26 (citing Ex. 1072, 186)) and a filing made by Patent Owner in the District Court litigation and states “[Patent Owner]’s opening *Markman* brief more fully explains its rationale.” *Id.* at 26 (citing

Ex. 1076, 5–8).²² Moreover, in the Petition, Petitioner states that it disagrees with Patent Owner; “believes the plain and ordinary meaning applies without further construction;” and “[r]ewriting the claims as [Patent Owner] proposes is unwarranted.” *Id.*

In its Response, Patent Owner provides no argument or reasoning supporting making changes to the language of claims 18 or 19. *See* PO Resp. 5–6. Indeed, Patent Owner contends that “[f]or the purposes of this proceeding, Patent Owner does not contend that any further claim construction is required.” *Id.* Patent Owner argues patentability of claims 18–20 under the unchanged language of claims 18 and 19. *See id.* at 44–47.

In its Reply, Petitioner’s entire argument in support of changing the language in claims 18 and 19 consists of a summary of Patent Owner’s assertions and argument from a paper (Exhibit 1076) filed by Patent Owner in the District Court. Pet. Reply 7. The Petitioner’s Reply provides:

P[atent] O[wner] 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.

²² This is improper incorporation by reference. *See* 37 C.F.R. § 42.6(a)(3) (“Arguments must not be incorporated by reference from one document into another document.”).

Id. Petitioner neither agrees with or adopts Patent Owner’s assertions or argument. *Id.* To the extent Petitioner attempts to support its request that the language of claims 18 and 19 be changed, it does so by citing to assertions and arguments made by Patent Owner in an exhibit without setting forth any supporting reasoning or explanation in the Reply. *See id.* Once again, this is improper incorporation by reference. 37 C.F.R. § 42.6(a)(3). Nonetheless, Petitioner contends that “[h]aving instituted on all claims, the Board should now assess whether claims 18-19 contain a scrivener’s error and decide patentability accordingly.” Pet. Reply 7.

In the Sur-reply, Patent Owner argues that Petitioner should not be allowed to adopt the changes to claims 18 and 19 that Petitioner argued were wrong in the Petition. PO Sur-reply 3–4.

Summing up the record with regard to these changes, there exists no developed argument or reasoning supporting changing the language of claims 18 and 19 in any of the briefing in this proceeding. Although we deny the request to consider the patentability of claims 18–20 based on changing the recited language because there is no support in the record, we also consider whether such the proposed changes are appropriate and determine they are not.

ii. The Language of Claims 18 and 19 is Clear

We start our consideration of whether the changes are appropriate by considering the language of the claims. Claims 18 and 19 of the ’420 patent recite:

18. *A communication system, comprising:*
*a USB hub **including** 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;

*a USB host-to-host bridge connected to said first USB port;
a USB routing switch providing a first communication path between said second USB port and said USB host-to-host bridge and a second communication path between said second USB port and said first USB port that bypasses said USB host-to-host bridge, wherein 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, thereby providing bidirectional initiation of communication between the USB host and the consumer device and wherein 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.*

*19. The communication system according to claim 18 further comprising a second consumer device, wherein the USB hub **includes** a third USB port and wherein the USB routing switch further connects a third communication path between said third USB port and said first USB port that bypasses said USB host-to-host bridge, thereby only responding to communication initiated by the USB Host when the second consumer device is connected to said third USB port and is operating in the USB device mode.*

Ex. 1003, 12:7–40 (emphasis added). There do not appear to be errors in the language of claims 18 and 19 as to use of “including” in the first limitation of claim 18 and “includes” in the additional limitation of claim 19 (or otherwise). This language in claims 18 and 19 (and claim 20) makes sense logically, technically, and grammatically. We determine that the language of claims 18 and 19 does not indicate that there are errors in these claims that need correction.

iii. The File History Provides No Indication of Error

We next consider whether the file history of the '420 patent indicates error. As filed and written by patent applicant, claim 18 (filed claim 28) states, “[a] communication system, comprising a USB hub **including** a first USB port and a second USB port” (Ex. 1004, 36:15 (emphasis added)) and claim 19 (filed claim 29) states, “the USB hub **includes** a third USB port” (*id.* at 37:5 (emphasis added)). This exact language is present in issued claims 18 and 19. Ex. 1003, 12:7–40.

During prosecution, the Examiner reviewed the claims and made changes that were authorized by the Applicant’s attorney.²³ Ex. 1004, 147. These changes included changes to the language of the last limitation of claim 18 (pending claim 28) and claim 19 (pending claim 29). *Id.* at 153–154. The Examiner did not change “including” in claim 18 or “includes” in claim 19. *See id.* These actions provide an indication that the Examiner and the Applicant did not consider “including” in claim 18 or “includes” in claim 19 to be errors. The file history of the '420 patent does not support a contention that there are errors in claims 18 and 19.

iv. The Other Claims Do Not Indicate Error

We next compare the claims of the '420 patent. Independent claim 1 of the '420 patent recites, “[a] Universal Serial Bus module, comprising: . . . a USB hub **interconnected to** the first USB port and the second USB port.” Ex. 1003, 9:11–16 (emphasis added). Independent claim 7 recites, “[a]n

²³ The Applicant was given the opportunity to object to the Examiner’s amendments to the claims and to propose further amendments. *See* 1004, 147 (“An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312.”). The Applicant did not object to the Examiner’s amendments or propose further amendments. *See generally id.*

integrated circuit, comprising: 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.” *Id.* at 9:60–63 (emphasis added).

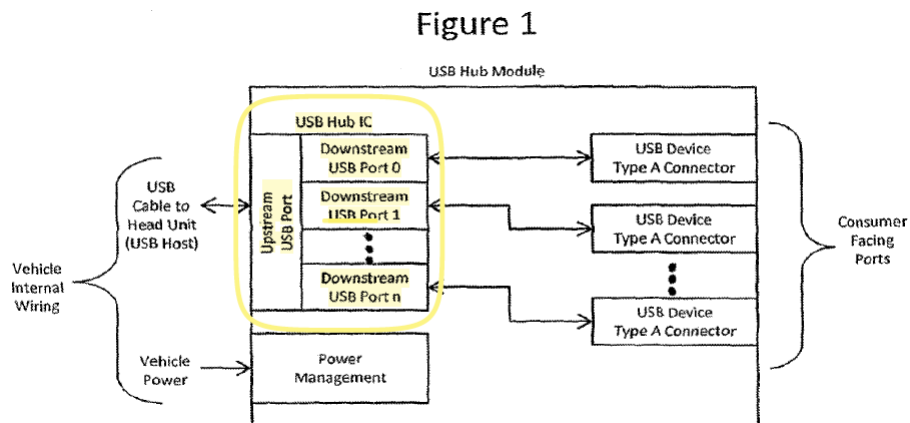
Independent claim 13 recites, “[a] method of operating a USB hub module having a USB hub configured to be **interconnected to** a first USB port connected to a USB host and a second USB port connected to a consumer device.” *Id.* at 10:41–44 (emphasis added). Independent claim 15 recites “[a] Universal Serial Bus (USB) connectivity module, comprising: a first USB port; a second USB port” (*id.* at 10:67–11:2) and dependent claims 16 and 17 recite, “further comprising a third USB port” (*id.* at 11:23, 11:38), but none of these three claims recite a USB hub (*id.* at 10:65–12:6). And, as previously discussed, independent claim 18 recites, “[a] communication system, comprising a USB hub **including** a first USB port and a second USB port” (*id.* at 12:7–9 (emphasis added)) and claim 19 recites, “the USB hub **includes** a third USB port” (*id.* at 12:34 (emphasis added)).

The ’420 patent contains five sets of independent and dependent claims: (1) claims 1–6; (2) claims 7–12; (3) claims 13 and 14; (4) claims 15–17; and (5) claims 18–20). Ex. 1003, 9:11–12:47; *see also* PO Resp. 3 (“The ’420 Patent contains claims directed to a USB hub module (claims 1-6) (not challenged in this proceeding), an integrated circuit (claims 7-12) (not challenged in this proceeding), a method of operating a USB hub module (claims 13-14), a USB connectivity module (claims 15-17) (not challenged in this proceeding), and a communication system (claims 18-20).”). Each of the sets of claims have different scope and language. And, the ’420 contains a set of claims (claims 15–17) that contain no limitations relating to the first or second USB port being “interconnected to” a USB hub (or even

explicitly, a USB hub). It is proper, and not at all unusual, for claims of a patent to have differences in scope and language.²⁴ The varying of claim scope and language is a fundamental strategy employed by skilled patent attorneys to obtain strong and enforceable patents that provide comprehensive protection for their clients' inventions. We determine that the differences in claim language do not support the contention that there are errors in claims 18 and 19.

v. The Specification Does Not Support Finding Error

Finally, we analyze the Specification of the '420 patent to see if it supports finding the alleged error in claims 18 and 19 and determine that it does not. Figures 1 and 2 of the '420 patent (yellow annotations added) are reproduced below.



²⁴ Manual of Patent Examining Procedure (MPEP) § 608.01(m) (9th ed. rev. Nov. 2024) (“court decisions have confirmed applicant’s right to restate (i.e., by plural claiming) the invention in a reasonable number of ways.”).

Figure 2

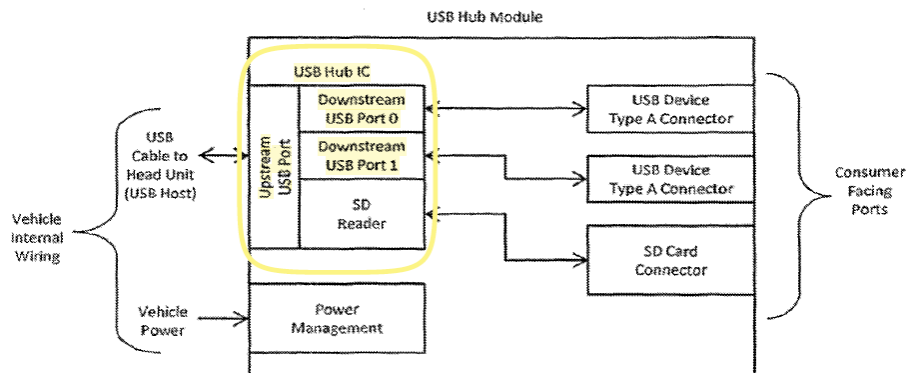


Figure 1 depicts “a system wherein a multiple port self-powered USB Hub functions to connect a single USB Host to a plurality of USB ports” and Figure 2 depicts “a system wherein a self-powered USB Hub provides not only a plurality of USB ports, but also a Secure Digital (“SD”) card reader.” Ex. 1003, 5:12–17. Both the “USB Hub IC”²⁵ illustrated in Figure 1 and Figure 2 include an “Upstream USB Port” and a plurality of “Downstream USB Port[s].” The detailed description of Figures 1 and 2 in the Specification provides;

As shown in FIGS. 1 and 2, a single USB Hub can connect one USB Host to several USB Devices. Specifically, FIG. 1 illustrates a system wherein a self-powered USB Hub having a plurality of USB ports connects to a plurality of USB Devices (via a plurality of consumer-facing USB ports), while FIG. 2 illustrates a system wherein a self-powered USB Hub provides not only a plurality of USB ports which are in communication with a plurality of consumer-facing USB ports, but also a Secure Digital (“SD”) card reader which is connected to a consumer-facing SD card connector.

²⁵ In the ’420 patent, IC is used as an acronym for integrated circuit. See, e.g., Ex. 1004, 5:54.

Id. at 2:2–12. Figures 1 and 2 of the '420 patent and the related detailed descriptions depict and describe “a USB hub **including** a first USB port and a second USB port” as recited in claim 18 and “the USB hub **includes** a third USB port” as recited in claim 19.

Figure 4 of the '420 patent (yellow annotations added) is reproduced below.

Figure 4

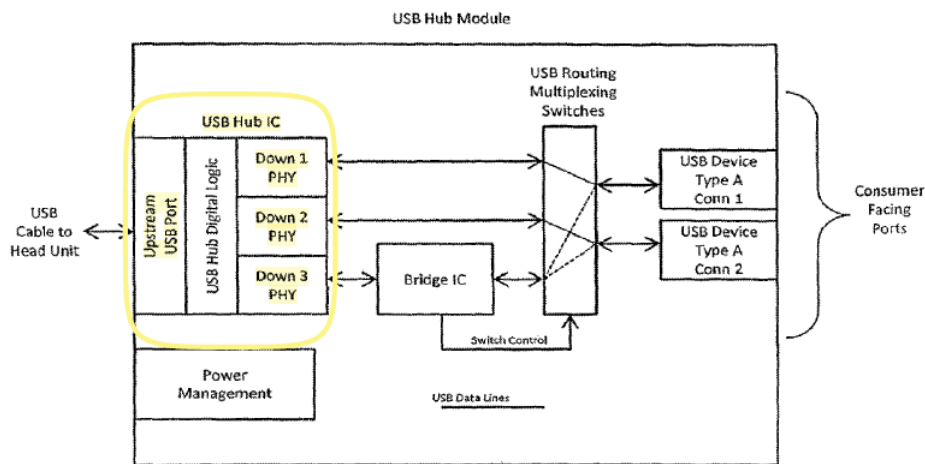


Figure 4 depicts “a system which is in accordance with an embodiment of the present invention.” In Figure 4, “USB Hub IC” includes “Upstream USB Port.” And, “[t]he USB Hub also **includes** a plurality of downstream USB ports.” Ex. 1003, 5:58–60 (emphasis added). Figure 4 of the '420 patent and the related detailed description depict and describe “a USB hub **including** a first USB port and a second USB port” as recited in claim 18 and “the USB hub **includes** a third USB port” as recited in claim 19.

Figure 5 of the '420 patent (yellow annotations added) is reproduced below.

Figure 5

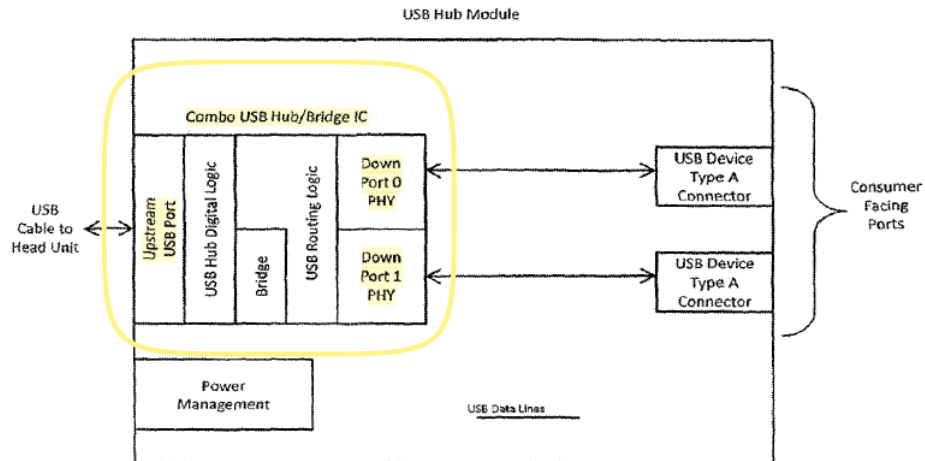


Figure 5 depicts, “an alternative embodiment wherein the switching device comprises USB routing logic, and both the USB routing logic and the USB Bridge are integrated with the USB Hub in a combination USB Hub/USB Bridge Integrated Circuit (IC).” Ex. 1003, 7:11–15. In Figure 5, “Combo USB Hub/Bridge IC” is shown as including “Upstream USB Port” and “Down Port 0 PHY” and “Down Port 1 PHY.” Figure 5 of the ’420 patent depicts “a USB hub **including** a first USB port and a second USB port” as recited in claim 18 and “the USB hub **includes** a third USB port” as recited in claim 19.

Figure 6 of the ’420 patent (yellow annotations added) is reproduced below.

Figure 6

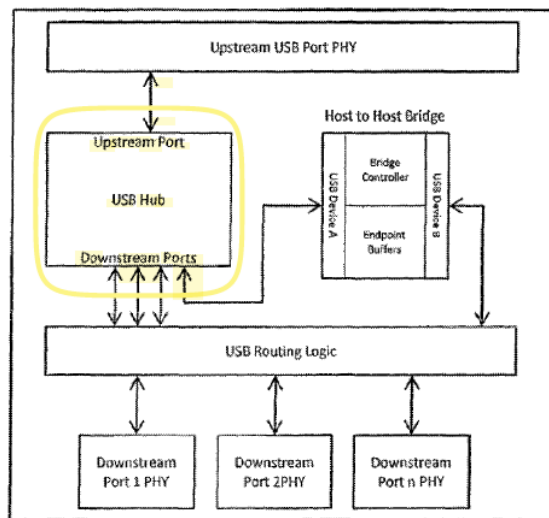


Figure 6 depicts “the internal components of the USB Hub/USB Bridge Integrated Circuit (IC) shown in FIG. 5.” Ex. 1003, 7:18–19. As illustrated in Figure 6, a “USB Hub” includes an “Upstream Port” and “Downstream Ports.” Figure 6 of the ’420 patent depicts “a USB hub **including** a first USB port and a second USB port” as recited in claim 18 and “the USB hub **includes** a third USB port” as recited in claim 19.

Figure 8 of the ’420 patent (yellow annotations added) is reproduced below.

Figure 8

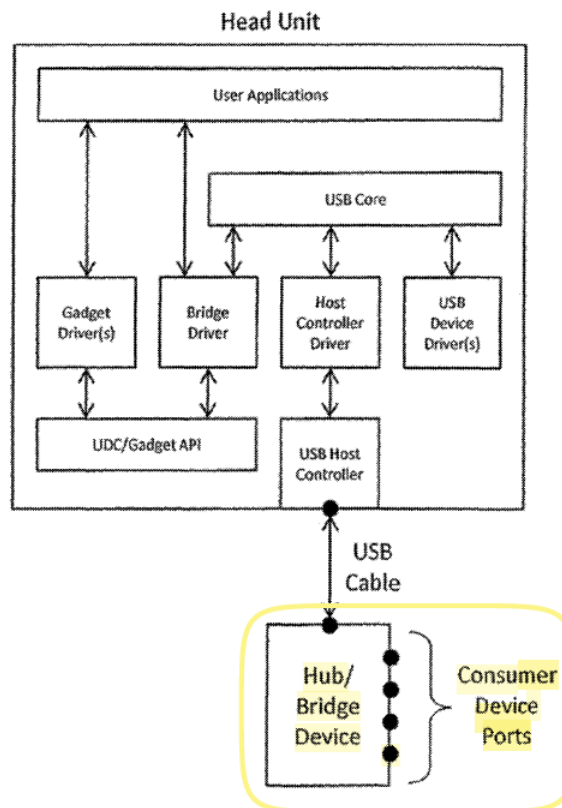


Figure 8 depicts “one possible configuration of the system architecture including software components in the Head Unit interfacing with the Bridge/Hub.” Ex. 1003, 8:39–41. As illustrated in Figure 8, a “Hub/Bridge Device” includes four “Consumer Device Ports.”

The Specification of the ’420 patent depicts and describes “a USB hub **including** a first USB port and a second USB port” as recited in claim 18 and “the USB hub **includes** a third USB port” as recited in claim 19. The Specification does not support the contention that these recitations are made in error.

vi. Summary Regarding the Alleged Errors in Claims 18 and 19

The Petition does not support a determination that “a USB hub **including** a first USB port and a second USB port” as recited in claim 18

and “the USB hub ***includes*** a third USB port” as recited in claim 19 were errors. The claims, file history, and Specification of the ’420 patent indicate that claims 18 and 19 do not contain any errors. We reject the contention that claims 18 and 19 contain errors.

We agree with the parties that claims 18–20 of the ’420 patent should be given their plain and ordinary meaning. Pet. 26 (“Petitioner . . . believes the plain and ordinary applies without further construction.”); PO Sur-reply 3–4.

b. Claims 18–20 Are Not Shown to be Unpatentable

Petitioner does not contend that claims 18–20 are unpatentable if given their plain and ordinary meaning. Pet. 27–28 (“Petitioner does not contend the Ground herein renders the Challenged Claims unpatentable under the plain and ordinary meaning.”). Despite disagreeing that error occurred and with Patent Owner’s attempt in the District Court to change the language of claims 18 and 19 (*id.* at 26), Petitioner adopts these changes in its unpatentability contentions (*see id.* at 27, 73, 85). Petitioner makes no showing that claims 18–20 as recited in the ’420 patent are unpatentable.

In its Response, Patent Owner argues patentability of claims 18–20 under the unchanged language of claims 18 and 19. PO Resp. 44–47. Patent Owner argues and shows that the combination of teachings proposed in the Petition cannot meet the limitations of claims 18–20 that the USB hub include first, second, and third USB ports. *Id.* On this record, we determine that claims 18–20 of the ’420 patent are not unpatentable.

5. Summary of Findings and Basis for Conclusions

We have considered all the arguments and evidence presented by the parties. Based upon a strong preponderance of the evidence, we find that the combination of Chang and Chang II teaches all the limitations of challenged claims 13 and 14 and that a skilled artisan would have been motivated to combine the relied-upon teachings of Chang and Chang II as set forth in the challenged claims. With regard to the secondary considerations of non-obviousness, we find that Patent Owner has failed to show a nexus between the proffered secondary consideration evidence and the subject matter of the claims. And, weighing the evidence of obviousness against the evidence of non-obviousness, we find that the evidence of obviousness is strong and the evidence of non-obviousness is weak.

With regard to challenged claims 18–20, we do not incorporate the changes to claims 18 and 19 that are presented in the Petition as we determine that there is no basis for finding errors in these claims. Accordingly, claims 18–20 have not been shown to be unpatentable in the Petition.

III. PENDING MOTIONS

A. Patent Owner’s Motion to Strike

Patent Owner moves to strike a section of Petitioner’s Reply (Section V.A.3.b. (Pet. Reply 13–16)); paragraphs 6–17 and 44–57 of Exhibit 1102 (Reply Declaration of Eric Welch); and Exhibit 1103 (Excerpts from *The ART of Electronics*, P Horowitz and W. Hill, Cambridge University Press, 2nd Edition (1989)) in its entirety. Paper 37, 1. Petitioner opposes Patent Owner’s Motion to Strike. Paper 38. Patent Owner filed a Reply. Paper 43.

Patent Owner argues that “[t]he Board should grant the Motion because the Reply improperly presents new theories of unpatentability with belated supporting evidence that could have been present in the Petition itself.” Paper 37, 1. Patent Owner contends that, in response to an argument Patent Owner made in the Response that “Petitioner’s proposed prior art combination features a structural flaw” (*id.* at 2), Petitioner’s Reply improperly presents a new argument not found in the Petition (*id.* at 3–6). As discussed *supra* (section II.E.3.a.), we determine that, because Patent Owner’s structural flaw argument fails, we do not reach the alleged new argument and evidence that Patent Owner seeks to strike. Accordingly, this motion is moot.

For this reason, we deny Patent Owner’s Motion to Strike (Paper 37).

B. Petitioner’s Motion to Exclude Evidence

Petitioner filed a motion to exclude a number of Patent Owner’s exhibits (Ex. 2001– 2003, 2005–2010, 2017, 2019, 2024–2028, 2030–2043) on various grounds. Paper 35, 1. Patent Owner filed an Opposition to the motion (Paper 39) and Petitioner filed a Reply in support of the motion (Paper 41).

1. Exhibits 2001 and 2019 (Houh Declarations)

Exhibit 2001 is the Declaration of Henry Houh filed with Patent Owner’s Preliminary Response. Exhibit 2019 is the Supplemental Declaration of Henry Houh filed with Patent Owner’s Response. Petitioner argues, “[t]he Board should exclude Dr. Houh’s testimony in its entirety as

impermissible expert testimony by a lay person (FRE 701^[26]/702^[27]) (*viz.*, expert testimony by a non-expert who does not satisfy the qualifications of a POSITA [person of ordinary skill in the art]) and as being based on an incorrect POSITA standard/definition, making it irrelevant, unreliable, and unfairly prejudicial.” Paper 35, 1. Petitioner’s request to exclude the Houh Declarations is based upon the Board accepting Petitioner’s contention that a POSITA would have knowledge and experience with USB standards and the design and deployment of USB hosts, USB devices, and USB Hubs. *Id.* at 2 (“If the Board agrees [with Petitioner’s definition of a POSITA], it should exclude Dr. Houh’s testimony because: (1) he rendered no opinions under the correct POSITA definition; and (2) he lacks the qualifications of a POSITA.”), 3 (“Thus, if the Board agrees USB experience/knowledge is required, it should exclude Dr. Houh’s testimony as irrelevant and far more prejudicial than probative.”). As discussed *supra* (section II.B.), we do not

²⁶ Federal Rule of Evidence 701 states: “If a witness is not testifying as an expert, testimony in the form of an opinion is limited to one that is: (a) rationally based on the witness's perception; (b) helpful to clearly understanding the witness's testimony or to determining a fact in issue; and (c) not based on scientific, technical, or other specialized knowledge within the scope of Rule 702.”

²⁷ Federal Rule of Evidence 702 states: “A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if the proponent demonstrates to the court that it is more likely than not that: (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; (b) the testimony is based on sufficient facts or data; (c) the testimony is the product of reliable principles and methods; and (d) the expert’s opinion reflects a reliable application of the principles and methods to the facts of the case.”

adopt Petitioner’s definition of a POSITA because of the lack of evidentiary support.

Petitioner argues that “[t]he Board should also exclude Dr. Houh’s secondary considerations testimony (re long-felt need, failure/skepticism of others, and copying) at ¶¶143-160 of EX2019 under *Daubert*^[28] and FRE 403^[29].” Paper 35, 1. However, this argument is not well-developed and is largely skeletal and conclusory. Nonetheless, to the extent Petitioner’s argument is explained, we consider it.

With regard to long-felt need, Petitioner argues that Dr. Houh’s testimony does not establish that any alleged need was long-felt. Paper 35, 6. Petitioner argues:

[B]y Dr. Houh’s own admission ([Ex. 2019] ¶42), Apple informed “automakers of its plans to release a new technology known as CarPlay” “around 2013,” the same year the patent was filed. That cannot constitute long-felt need and Dr. Houh’s self-contradictory “long-felt need” testimony is a waste of time, unfairly prejudicial, unreliable, lacks foundation / personal knowledge, and should be excluded.

Id. Thus, Petitioner challenges Dr. Houh’s testimony on long-felt need on the merits. As discussed *supra* (section II.E.3.g.), even considering Dr. Houh’s testimony, we find that Patent Owner fails to establish that there existed a long felt but unsatisfied need for the invention claimed in the ’420

²⁸ *Daubert v. Merrell Dow Pharms, Inc.*, 509 U.S. 579 (1993).

²⁹ Federal Rule of Evidence 403 states that, “[t]he court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.”

patent. Although we consider Petitioner’s challenge to these paragraphs to have some merit especially as Dr. Houh “lacks automotive industry expertise and has no independent knowledge or qualifications to opine on car maker’s wishes” (*id.*), it is unnecessary to exclude this testimony as requested by Petitioner as we find in Petitioner’s favor on long-felt need even considering this testimony and giving it appropriate weight.

Petitioner requests that we exclude paragraphs 148–150 of Dr. Houh’s testimony related to failure/skepticism of others. Paper 35, 6. However, in arguing “[f]ailure of others/skepticism of skilled artisans,” Patent Owner does not discuss, cite, or otherwise rely on Dr. Houh’s testimony. See PO Resp. 69–72. Petitioner does not direct our attention to any use of this testimony by Patent Owner. See Paper 43, 6. Accordingly, we did not consider this testimony in determining whether Patent Owner had shown “[f]ailure of others/skepticism of skilled artisans.” See Section II.E.3.g.

Petitioner requests that we exclude paragraphs 151–157 of Dr. Houh’s testimony related to copying. Paper 6–7. In its argument regarding copying, Patent Owner does not discuss, cite, or otherwise rely on paragraphs 151–157. See PO Resp. 75–80. And, we did not rely on this testimony or the testimony in paragraph 144 in deciding whether Patent Owner had shown copying. See Section II.E.3.g. In analyzing copying *supra* (*see id.*), we determine that Patent Owner’s allegations of copying by Petitioner are not well-supported without considering Dr. Houh’s testimony on copying.

In summary, Petitioner fails to show that Dr. Houh’s Declarations (Exhibits 2001 and 2019) should, in whole or in part, be excluded.

2. Remaining Challenged Exhibits

The additional exhibits that Petitioner requests that we exclude were not used by Patent Owner to support its arguments relating to secondary considerations or were not cited by Patent Owner. *See* Paper 35, 7–15; PO Resp. 63–96.

Petitioner acknowledges that Exhibits 2017 and 2043 were not cited by Patent Owner. Paper 35, 8. Petitioner requests that we exclude Exhibit 2035 (*id.* at 10), but does not allege that it is cited by Patent Owner (*see id.* at 11). We could find no discussion or citation of, or reliance by Patent Owner, on Exhibit 2035. *See generally* PO Resp. We did not rely on these exhibits.

With regard to the remaining challenged exhibits, as acknowledged by Petitioner (*id.*), these exhibits are used by Patent Owner to make arguments to establish secondary considerations of non-obviousness or nexus. *See also* PO Resp. 63–96. As discussed *supra* (Section II.E.3.g.), we find in Petitioner’s favor in that we determine that the secondary considerations evidence offered by Patent Owner lacks sufficient weight in view of the Petitioner’s evidence of obviousness and that Patent Owner fails to show a nexus between its secondary considerations evidence and the claimed invention. In weighing the evidence of secondary considerations and nexus, we were also cognizant of Petitioner’s objections to these exhibits and accordingly gave them appropriate weight.

For these reasons, we deny Petitioner’s Motion to Exclude Evidence (Paper 35).

IV. CONCLUSION

We conclude that claims 13 and 14 of the '420 patent are unpatentable as obvious in view of Chang and Chang II. We conclude that, based on the record in this proceeding, claims 18–20 of the '420 patent have not been shown to be unpatentable. A summary of our conclusions is set forth in the table below.

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
13, 14, 18–20	103	Chang, Chang II	13, 14	18–20
Overall Outcome			13, 14	18–20

V. ORDER

Accordingly, it is

ORDERED that claims 13 and 14 of U.S. Patent No. 9,619,420 B2 are determined to be unpatentable;

ORDERED that claims 18–20 of U.S. Patent No. 9,619,420 B2 are not determined to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Strike (Paper 37) and Petitioner's Motion to Exclude Evidence (Paper 35) are denied;

FURTHER ORDERED that, no later than ten business days after the issuance of this Final Written Decision, the parties may file a joint motion to seal portions of this Final Written Decision, explaining why portions of it should remain under seal, and including as an attachment a redacted version of the Final Written Decision that can be made publicly available;

FURTHER ORDERED that the present decision shall remain under seal until any joint motion to seal the Final Written Decision is resolved;

FURTHER ORDERED that the present decision shall be made public if, after the expiration of the time for the parties to file a joint motion to seal, no such motion has been filed; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Patent 9,619,420 B2

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