

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROCHIP TECHNOLOGY INC.,
Petitioner,

v.

APTIV TECHNOLOGIES AG,
Patent Owner.

PGR2024-00011
Patent 11,681,643 B2

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

HOMERE, *Administrative Patent Judge*.

DECISION
Granting Institution of Post-grant Review
35 U.S.C. § 324

I. INTRODUCTION

A. Background

Microchip Technology Inc. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting post-grant review of claims 1–15 (“the challenged claims”) of U.S. Patent No. 11,681,643 B2 (Ex. 1011, “the ’643 patent”). Aptiv Technologies AG (“Patent Owner”) filed a Preliminary Response (Paper 9, “Prelim. Resp.”). Petitioner filed a Preliminary Reply (Paper 10, “Pet. Prelim. Reply”)¹ and Patent Owner filed a Preliminary Sur-reply (Paper 11 “PO Prelim. Sur-reply”).

We have authority to determine whether to institute a post-grant review. 35 U.S.C. § 324(a) (2018); 37 C.F.R. § 42.4(a) (2023) (“The Board institutes the trial on behalf of the Director.”). Section 324(a) provides that a post-grant review may not be instituted “unless . . . the information presented in the petition . . . , if such information is not rebutted, would demonstrate that it is more likely than not that at least 1 of the claims challenged in the petition is unpatentable.”

Upon considering the evidence and arguments in the Petition (including its supporting testimonial evidence) and the evidence and arguments in the Preliminary Response (including its supporting testimonial evidence), we determine that the information presented shows that it is more likely than not that Petitioner would prevail with respect to at least one of the challenged claims. Accordingly, we institute post-grant review on all

¹ The Preliminary Reply addresses Patent Owner’s arguments and evidence in the Preliminary Response concerning internal Microchip emails and CarPlay development.

challenged claims on all asserted grounds. *See* 37 C.F.R. § 42.208(a) (“When instituting post-grant review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”); *see also SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018).

B. Real Parties in Interest

Petitioner identifies itself and its subsidiaries as real parties in interest. Pet. 110.

Patent Owner identifies itself and Aptiv Services US, LLC as real parties in interest. Paper 4, 2.

C. Related Matters

The parties indicate that the ’643 patent is the subject of the following district court proceeding:

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

Pet. 110; Paper 7, 1. The parties note other petitions for *inter partes* review filed by Petitioner and challenging patents owned by Patent Owner.

Pet. 110; Paper 7, 1–2. More particularly, Petitioner filed petitions for *inter partes* review as follows:

PTAB Proceeding	Patent
IPR2024-00228	9,619,420
IPR2024-00229	9,645,962
IPR2024-00230	11,176,072
IPR2024-00494	9,460,037

PTAB Proceeding	Patent
IPR2024-00495	9,619,420
IPR2024-00496	10,545,899
IPR2024-00558	9,460,037

Pet. 110; Paper 7, 1–2.

D. The Challenged '643 Patent

The '643 patent relates to a method 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 connected to the same USB hub. Ex. 1011, code (57).

The '643 patent explains that historically

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 1:38–43. The '643 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 1:50–54.

As described in the '643 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 2:55–66. In other words, a phone may configure itself such that it can function as a USB device or as a USB host when it needs to be. *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 3:8–20. The '643 patent states that existing solutions to this problem such as On the Go (OTG) technology and dynamic swapping of ports have disadvantages. *Id.* at 3:21–4:3. The '643 patent summarizes the invention as follows:

[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 4:16–33.

Figure 4, reproduced below, illustrates a USB hub module having a USB hub IC (integrated circuit), a USB bridge IC, and a switching device having switches. *Id.* at 5:24–27.

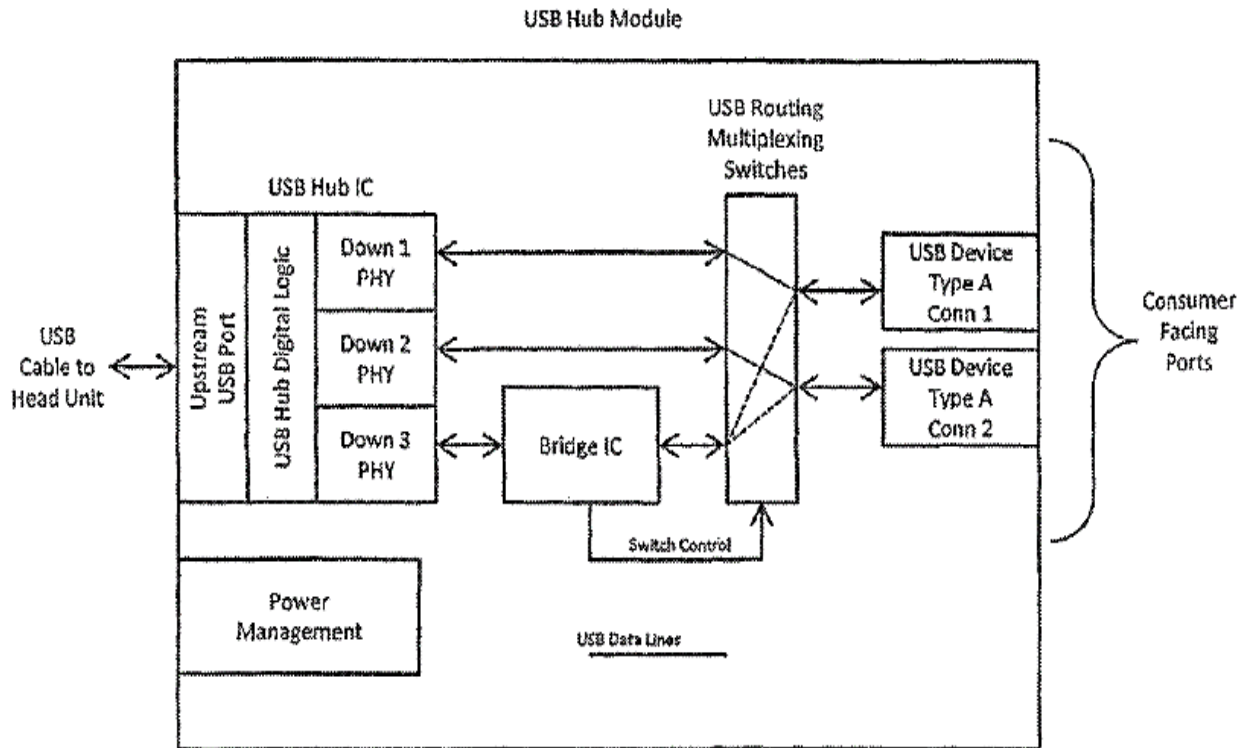


Figure 4, above, depicts a USB hub IC configured to render a vehicle's embedded USB host compatible with consumer devices configured to act as a USB host or as a USB device. *Id.* at 5:50–53. The USB hub IC is configured to be connected (via an upstream USB port) to a vehicle's embedded USB host (such as a USB host in a head unit) via vehicle internal wiring. *Id.* at 5:56–60. The USB hub IC also includes three downstream USB ports, one of which is connected to the switching device (e.g., multiplexing switches) via the USB bridge IC. *Id.* at 5:61–65. The other two downstream USB ports of the USB hub IC are connected directly to the switching device, thereby bypassing the bridge IC. *Id.* at 5:65–67. The switches are connected to two USB ports in the vehicle, for connection to a consumer device. *Id.* at 6:1–5. The USB bridge IC effectively controls the switches. *Id.* Therefore, the USB hub module is configured such that signals received from a consumer device via a USB port are received by the

switching device, which routes the signals to the USB hub IC directly or via the USB bridge. *Id.* at 6:5–8.

In the case where the consumer device is acting as a USB host, the switching device receives the USB packets from the consumer port, routes the packets to the USB bridge IC, which processes and forwards them to the USB hub IC, thereby rendering the consumer device compatible with the vehicle's embedded USB host. *Id.* at 6:8–13. 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 6:13–17.

“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 8:63–67.

E. The Challenged Claims

Petitioner challenges claims 1–15 of the '643 patent. Pet. 1. Claims 1, 5, and 10 are independent. Ex. 1011, 9:15–16:59. Claims 2–4 depend on independent claim 1; claims 6–9 depend on independent claim 5, and 11–15 depend on independent claim 10. *Id.* Claim 1 is illustrative of the challenged claims and is reproduced below.

1. A method, comprising:
 - a) providing a first USB port for communication with a USB host;
 - b) providing a second USB port for communicating with a consumer USB device;
 - c) providing a signal detection circuit for receiving USB signals from the consumer USB device via the second USB port;

- d) routing the USB signals emanating from the consumer USB device to the first USB port via a routing logic circuit connected directly to a USB bridge and a USB hub connected to the USB bridge in accordance with a determination by the signal detection circuit that the consumer device is operating in a USB host mode, wherein the USB bridge includes a bridge controller, buffers, and a plurality of ports; and
- e) routing the USB signals emanating from the consumer USB device to the first USB port via the routing logic connected directly to the USB hub and thereby bypassing the USB bridge in accordance with a determination by the signal detection circuit that the consumer device is operating in a USB device mode, wherein the USB hub and USB bridge have different components and functionality.

Ex. 1011, 9:15–39.

F. Prior Art and Asserted Grounds of Unpatentability

The Petition relies on the following prior art references:

Name	Reference	Exhibit
Chang	US Pub. 2006/0206650 A1, published September 14, 2006	1014
Chang II	US Pub. 2009/0268743 A1, published October 29, 2009	1015
Chutorash	US Pat. 8,447,598 B2, issued May 21, 2013	1029

Petitioner asserts claims 1–15 are unpatentable based on the following grounds (Pet. 5–6):

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1	1–15	103 ²	Obviousness over Chang in view of Chang II and POSITA Knowledge
2	2, 7, 13	103	Obviousness over Chang in view of Chang II, Chutorash, and POSITA Knowledge
3	1–15	112(b)	Indefinite
4	1–15	112(b)	Indefinite
5	1–9	112(f)	Indefinite
6	4, 9, 15	112(b)	Indefinite
7	4, 9, 15	112(a)	Written Description

Pet. 5–6. Petitioner submits a declaration of Eric Welch (Ex. 1013, “Welch Declaration”) in support of its contentions. Patent Owner submits a declaration of Henry Houh (Ex. 2001, “Houh Declaration”) in support of its contentions.

G. Eligibility for Post-Grant Review

As a threshold matter, we must determine whether the ’643 patent is eligible for post-grant review. The post-grant review provisions in section 6(d) of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (September 16, 2011) (“AIA”) apply only to patents that “contain[] or

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Because the challenged claims of the ’643 patent have an effective filing date no earlier than September 26, 2013, which is after the effective date of the applicable AIA amendments, we refer to the AIA version of 35 U.S.C. § 103 in this Decision.

contained at any time . . . a claim to a claimed invention that has an effective filing date . . . that is on or after [March 16, 2013].” AIA §§ 3(n)(1), 6(d), 6(f)(2)(A), 125 Stat. 284, 293, 305–312 (2011).

Each petitioner for post-grant review must certify that the challenged patent is available for post-grant review. 37 C.F.R. § 42.204(a). In addition, “[a] petition for a post-grant review may only be filed not later than the date that is 9 months after the date of the grant of the patent or of the issuance of a reissue patent (as the case may be).” 35 U.S.C. § 321(c). Petitioner has the burden to demonstrate eligibility for post-grant review. *See Mylan Pharms. Inc. v. Yeda Res. & Dev. Co.*, PGR2016-00010, Paper 9 at 10 (PTAB Aug. 15, 2016).

Petitioner certifies under 37 C.F.R. § 42.204(a) that the ’643 patent is available for post-grant review. Pet. 4. Petitioner also certifies “petitioner is not barred or estopped from requesting a *post-grant* review challenging the patent claims on the grounds identified in the petition.” *Id.* Patent Owner does not address post-grant review eligibility of the ’643 patent in its Preliminary Response.

On this record, we determine that the ’643 patent is eligible for post-grant review. The ’643 patent’s earliest claimed effective filing date is September 26, 2013 (the filing date of a provisional application to which the ’643 patent claims priority), which is after March 16, 2013. Ex. 1011, code (60). In addition, the Petition’s filing date, December 27, 2023 (Paper 6, 1), is not later than nine months after the ’643 patent’s grant date of June 20, 2023. Ex. 1011, code (45).

II. DISCRETIONARY DENIAL OF INSTITUTION

Petitioner contends discretionary denial under § 324(a) and § 325(d) is unwarranted. Pet. 106–110. We discuss each of these issues in turn below.

A. Denial under § 324(a)

Petitioner contends the Board should not discretionarily deny institution under § 324(a) in light of the following stipulation:

Petitioner hereby stipulates that, if the PTAB institutes this *post-grant* review, Petitioner will not pursue invalidity of the Challenged Claims in a parallel district court proceeding on the same grounds or any grounds that could have reasonably been raised before the PTAB in this Petition.

Pet. 106. Petitioner cites the Director’s Memorandum, *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation*, issued June 21, 2022 (“Guidance Memo”)³ in support of its contentions. Pet. 106.

Patent Owner does not address denial under § 324(a). *See generally* Prelim. Resp.

With the Guidance Memo in mind, we decline to exercise our discretion to deny institution in this proceeding in light of Petitioner’s stipulation.

³ Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

B. Denial under § 325(d)

Petitioner contends discretionary denial under § 325(d) is not warranted because at least the first prong from *Advanced Bionics*⁴ is not satisfied. Pet. 107. Petitioner additionally relies on *Becton, Dickinson*⁵ in support of its contentions. Pet. 107–110. Petitioner states that Chang and Chang II were submitted in an information disclosure statement (IDS) during the '643 patent prosecution. *Id.* at 107(citing Ex. 1012, 207–208). Petitioner contends the Examiner issued no rejections in view of Chang or Chang II and that it appears Chang II was possibly discussed during an interview, after which the claims were amended to require that (1) routing occurs via a “routing logic circuit connected directly to a USB bridge,” (2) the USB hub is “connected to the USB bridge,” and (3) “the USB hub and USB bridge have different components and functionality.” *Id.* (citing Ex. 1012, 201–206). Petitioner asserts that, although it is hard to discern the basis for these amendments, Chang II does not expressly disclose a discrete “routing logic” chip, which the Examiner may have viewed as distinguishing Chang II. *Id.* (citing Ex. 1015, Fig. 5).

Petitioner argues “[i]mportantly, there is no indication the Examiner considered combining Chang and Chang II . . . [a]nd there is no indication the Examiner considered this Petition’s argument regarding modifying Chang (in view of Chang II and a POSITA’s knowledge) to include a dual-

⁴ *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (Feb. 13, 2020) (precedential).

⁵ *Becton, Dickinson and Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) (the “*Becton, Dickinson* factors”).

role port.” *Id.* at 107–08. Petitioner asserts that the Examiner erred by not considering or by misapprehending important teachings of Chang and Chang II in view of the demonstration that routing circuits for routing USB ports to the appropriate paths were extremely well-known. *Id.* at 108–09. Therefore, Petitioner concludes both *Advanced Bionics*’ prongs favor institution, and additionally argues that none of Petitioner’s § 112 arguments was addressed during the ’643 patent prosecution. *Id.* at 109–10.

Patent Owner contends the Board should deny the petition under § 325(d) because the Examiner considered the same prior art references. Prelim. Resp. 22–24. Patent Owner argues both prongs of the *Advanced Bionics* framework strongly favor discretionary denial. *Id.* at 22. Patent Owner contends that Chang, Chang II, and Chutorash were presented to the Examiner in an Information Disclosure Statement (IDS) during prosecution and that Chang II was cited by the Examiner in an attachment to the Notice of Allowability. *Id.* at 22–23. Patent Owner contends that the Examiner did not overlook something persuasive, but instead “[t]he Examiner considered Chang II *immediately prior to allowance*. The Examiner amended the claims via an Examiner’s Amendment following an interview where Chang II was cited and presumably discussed. The Office’s consideration of Chang II is thus well developed.” *Id.* at 23 (citations omitted).

Patent Owner further argues Petitioner speculates that there is no indication the Examiner considered combining Chang and Chang II and Petitioner identifies no material error by the Examiner. *Id.* Patent Owner concludes that “the Board should deny institution under § 325(d) because the Petition sets forth identical art and fails to show any material error in the Office’s decision to grant the ’643 Patent.” Prelim. Resp. 24.

We decline to exercise discretion to deny institution under § 325(d) for the reasons discussed below.

1. Standards of Law

In evaluating the exercise of discretion to deny institution under § 325(d), the Board uses the following two-part framework: (1) determining whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, determining whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential).

In applying the two-part framework, we consider several non-exclusive factors, including:

- (a) the similarities and material differences between the asserted art and the prior art involved during examination;
- (b) the cumulative nature of the asserted art and the prior art evaluated during examination;
- (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
- (d) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art or patent owner distinguishes the prior art;

(e) whether petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art; and

(f) the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments.

Becton, Dickinson & Co. v. B. Braun Melsungen AG, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to Section III.C.5, first paragraph) (“*Becton, Dickinson*”). *Becton, Dickinson* factors (a), (b), and (d) relate to whether the art or arguments presented in the Petition are the same or substantially the same as those previously presented to the Office. *Advanced Bionics*, Paper 6 at 10. Factors (c), (e), and (f) “relate to whether the petitioner has demonstrated a material error by the Office” in its prior consideration of that art or arguments. *Id.* Only if the same or substantially the same art or arguments were previously presented to the Office do we consider whether the petitioner has demonstrated a material error by the Office. *Id.* “At bottom, this framework reflects a commitment to defer to previous Office evaluations of the evidence of record unless material error is shown.” *Id.* at 9.

2. *Becton, Dickinson (a), (b), and (d)*

It is undisputed that Chang and Chang II were before the Examiner during the ’643 patent prosecution. Pet. 107; Prelim. Resp. 19, 20, 22–24. The record before us indicates that the Examiner considered Chang and Chang II as indicated on the IDS,⁶ and that the Examiner subsequently discussed Chang II during an interview. *Id.*

⁶ Ex. 1012.

Although Petitioner's Chang and Chang II ground relies on prior art references that were before the Examiner, Patent Owner does not assert that the proposed combination of Chang and Chang II was evaluated by the Office and formed the basis of a rejection during examination by the Examiner. Prelim. Resp. 23. Most importantly, the record before us does not show that the Examiner had the benefit of evaluating the Chang and Chang II combination in light of Petitioner's expert evidence that routing switches (e.g., multiplexers crossbars, crosspoint) were well known to a POSITA before 2013 for the specific purpose of routing USB communications emanating from a product to the appropriate path upon detecting the host/device mode of a product. *Id.* at 11–13 (citing Ex. 1013 ¶¶ 88–96; Ex. 1017 ¶¶ 56–57; Ex. 1040, 4:39–5:29; Ex. 1041, 1:20–36; Ex. 1055, 284–88; Ex. 1052, 3:7–20; Ex. 1053 ¶¶ 31–34; Ex. 1059; Ex. 1060; Ex. 1063 Ex. 1068). As persuasively argued by Petitioner, there is no indication on the record before us that the Examiner considered the Petition's argument regarding “modifying Chang (in view of Chang II and a POSITA's knowledge) to include a dual-role port, which as a corollary, calls for a mux to steer USB signals to/from either Chang's host-to-device path (bypassing the bridge) or Chang's host-to-host path (through the bridge)” or that “routing circuits for routing USB ports to the appropriate path were extremely well-known.” Pet. 108.

Likewise, although Chutorash was submitted in an IDS and considered during the prosecution of the '643 patent, Patent Owner does not assert that the Examiner evaluated the combination of Chang, Chang II, and Chutorash, as supported by expert testimony, as proposed in Petitioner's other ground. Pet. 85, 109; Prelim. Resp. 19, 20, 22–24. Further, the record

before us is devoid of any evidence that the Examiner considered relying upon Chutorash for the limited purpose of teaching certain dependent claims' limitation of "an infotainment system," as argued by Petitioner. *Id.*

Additionally, as persuasively argued by Petitioner, Patent Owner does not assert nor does the record before us indicate that, during the prosecution of the '643 patent, the Examiner considered any of the § 112 arguments submitted by Petitioner in Grounds 3 through 7. *Id.* at 88–103, 109.

Because Patent Owner does not meaningfully address any of the proposed art combinations supported by expert testimony, or arguments evaluated by the Examiner during prosecution, Patent Owner does not sufficiently establish the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art.

3. *Becton, Dickinson (c), (e), and (f)*

Advanced Bionics further informs our evaluation of *Becton, Dickinson* factors (c), (e), and (f). *Advanced Bionics* indicates that satisfying the first part of the framework is a pre-requisite to reaching the second part of the framework. *See Advanced Bionics*, Paper 6 at 8, 10. As we explain above in our analysis of *Becton, Dickinson* factors (a), (b), and (d), we determine that the Petition does not set forth *a combination of prior art and arguments* that are the same or substantially the same as that considered by the Examiner during prosecution. Accordingly, we decline to exercise our discretion to deny institution pursuant to 35 U.S.C. § 325(d).

III. PATENTABILITY ANALYSIS

A. Principles of Law

A patent 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 the invention was made to a person having ordinary skill in the art to which the subject matter pertains. *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 skill in the art, and (4) when in evidence, any objective evidence of nonobviousness.⁷ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We analyze the asserted grounds based on obviousness with the principles identified above in mind.

B. Level of Ordinary Skill in the Art

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The person of ordinary skill in the art (POSITA) is a hypothetical person presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill in the art, we may consider certain factors, including: “(1) the educational level of the inventor; (2) type

⁷ We have considered the arguments and evidence set forth in Section VII.H of the Petition and Section II of Patent Owner’s Preliminary Response.

of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Best Med. Int’l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022) (citations omitted). “The patent’s purpose can also be informative.” *Id.*

Petitioner contends:

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.

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

Pet. 28–29 (citations omitted).

Patent Owner argues that because Petitioner has heightened its current definition of a POSITA from its initial definition presented in the co-pending district court litigation, it should be rejected. Prelim. Resp. 20. Patent Owner argues:

Petitioner’s POSITA definition in these proceedings requires familiarity with a litany of specific documents and standards absent from Petitioner’s POSITA definition in parallel district

court litigation. . . . Notably, Petitioner’s expert in district court—a co-author of the original USB Specification—did not require familiarity with the particular documents and standards Petitioner now identifies.

Id. 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. Lack of work experience can be remedied by additional education, and vice versa.

Id. (citations omitted).

At this stage, we find Patent Owner’s proposed level of a POSITA to be consistent with the problems and solutions disclosed in the ’643 patent and prior art of record, and adopt it as our own for purposes of this Decision. *See, e.g., In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (approving the determination of the level of ordinary skill in the art by appeal to the references of record). We nonetheless invite the parties to further address this issue, if they deem it necessary and appropriate. The parties should also specifically explain how different definitions for one of ordinary skill in the art relate to specific arguments and issues of unpatentability or claim construction, to the extent that a dispute remains as to who constitutes a POSITA.

C. Claim Construction

In a post-grant review, claims are construed using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b), including construing the claims in accordance with the ordinary and customary meaning of such claims as

understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.200(b). “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention” and “after reading the entire patent.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313, 1321 (Fed. Cir. 2005) (en banc). In addition to the specification and prosecution history, we also consider use of the terms in other claims and extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Id.* at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (alteration in original) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

“Petitioner submits that only the terms addressed in Grounds 3-6 (regarding indefiniteness) require construction for this proceeding.” Pet. 29 (footnote omitted).

Patent Owner contends:

The term “the USB routing switch includes the signal detection circuit” appears in dependent claims 4 and 9. Though Petitioner has not sought construction of this term, its invalidity arguments in Ground 6 fail to apply the plain and ordinary meaning of the word “includes.” . . . “In such circumstances, general purpose dictionaries may be helpful.” [*Phillips*, 415 F.3d at 1314.] Merriam Webster defines “include” to mean “to

take in or comprise as part of a whole or group.” As applied to the claims, the term “the USB routing switch includes the signal detection circuit” should be construed to mean that the USB routing switch comprises the signal detection circuit as part of a whole or group.

Prelim. Resp. 21 (citation omitted).

At this stage in the proceeding, and without further argument from the parties, we determine that we do not need to expressly construe any term for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)) (only terms that are in controversy need to be construed, and then only to the extent necessary to determine whether to institute review).

We note that this determination does not preclude the parties from arguing their proposed constructions of the claims during trial. Indeed, the parties are hereby given notice that claim construction, in general, is an issue to be addressed at trial. A final determination as to claim construction will be made at the close of the proceeding, after any hearing, based on all the evidence of record.

D. Overview of the Asserted Prior Art

1. Chang (Ex. 1014)

Chang relates to “a hub with a host-to-host transmission function” accomplished via “a bridge connected between the host port and hub control unit” allowing first and second hosts to communicate with each other.

Ex. 1014 ¶¶ 1, 5.

Figure 2 illustrates a conventional USB hub and is reproduced below.

Id. ¶ 13.

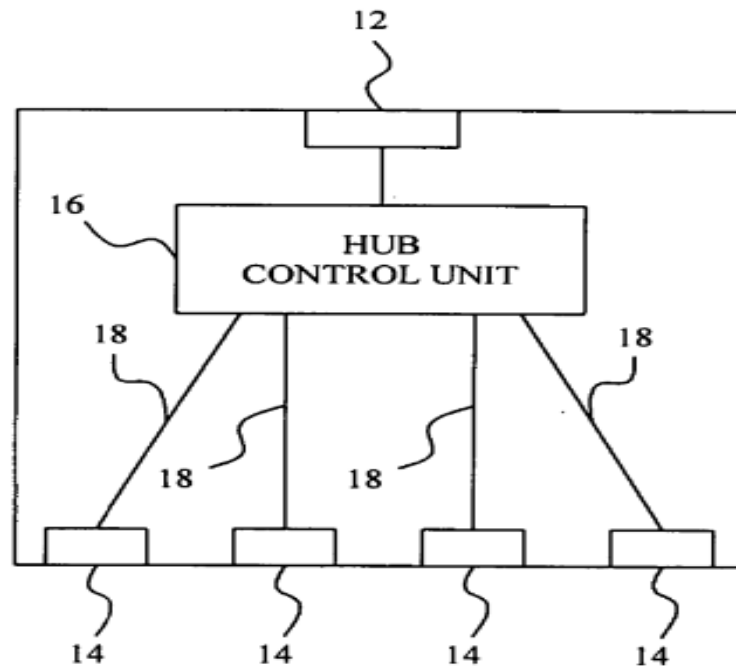


Figure 2 above illustrates a conventional USB hub including uplink port 12 for being linked to a host, downlink ports 14 for being linked to other devices, and hub control unit 16 for establishing communications between the ports. *Id.* ¶ 18. In the conventional USB hub, several transmission paths 18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

Chang summarizes its invention as follows:

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.

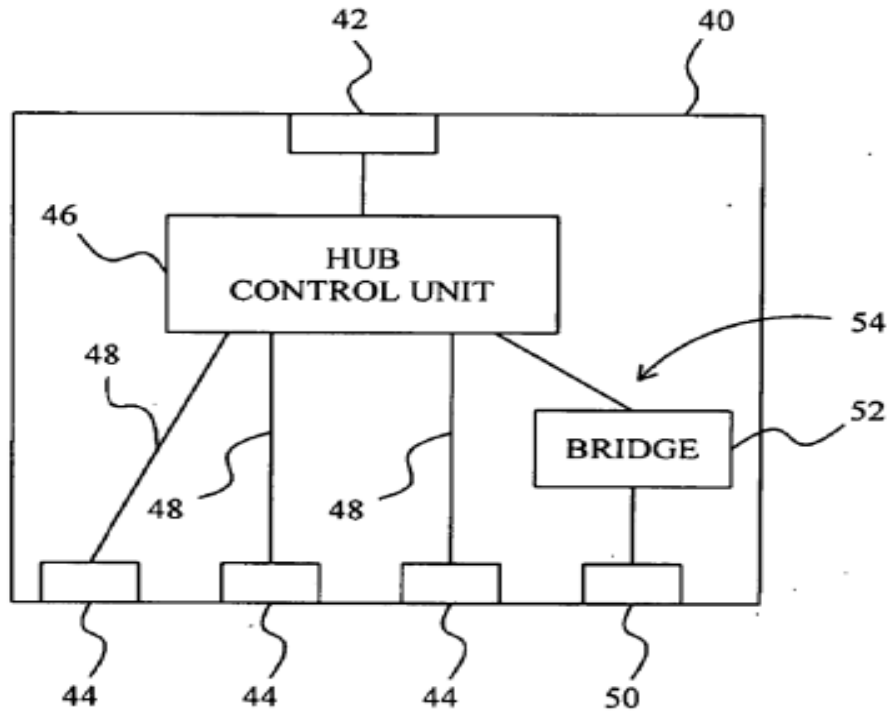


Figure 3 above shows hub 40 including uplink port 42 for being linked to a host, several downlink ports 44 for being linked to consumer devices, and hub control unit 46 for establishing several transmission paths 48 between uplink port 42 and downlink ports 44 such that the host linked to uplink port 42 can communicate with consumer devices linked to downlink ports 44. *Id.* Hub 40 further comprises host port 50 for connecting a consumer device operating as a host to the host at uplink port 42 via bridge 52 and control hub 46, together forming path 54 enabling host-to-host communications, which may be implemented with a bridge chip. *Id.* ¶¶ 20, 22, 24.

2. *Chang II* (Ex. 1015)

Chang II relates to a data transmission bridge device including a control chip for transmitting data that adopts USB specification, and can utilize switching to bridge between two host devices for transmitting data. Ex. 1015 ¶ 2. In particular, upon detecting the connecting device type (host/slave), the data transmission bridge device automatically switches between different transmission paths, which not only support data transfer between a host device and a slave device (host-to-device communication), but they also can directly support data transfer between two host devices (host-to-host communication). *Id.* ¶¶ 11, 12.

Figure 1 is a schematic diagram for a data transmission bridge device including a control chip for adaptively transmitting data to a detected connecting device and is reproduced below. *Id.* ¶ 15.

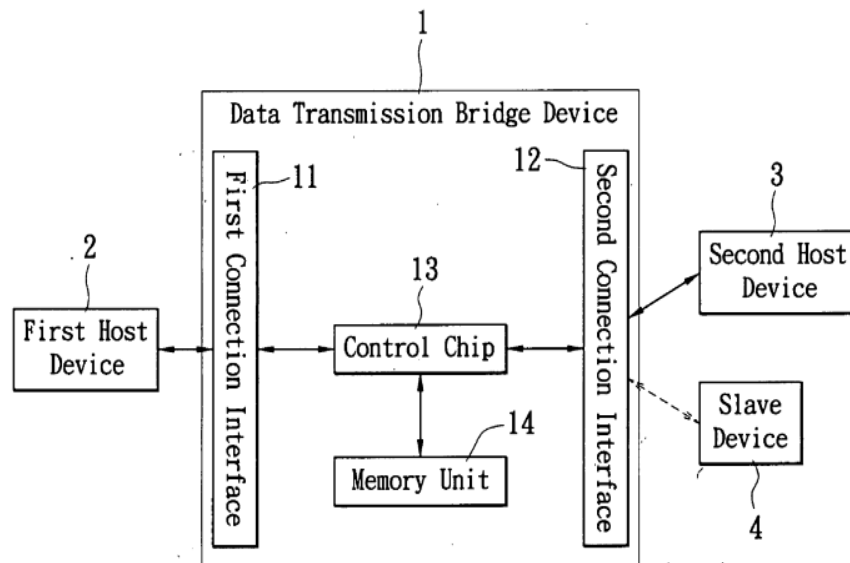


Figure 1 above illustrates data transmission bridge device 1 including first connection interface 11 for connecting to first host device 2, second connection interface 12 for connecting to second host device 3 or slave

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 illustrates a schematic diagram for control chip 13 of data transmission bridge device 1 for adaptively transmitting data to a detected connecting device and is reproduced below. *Id.* ¶¶ 19, 34.

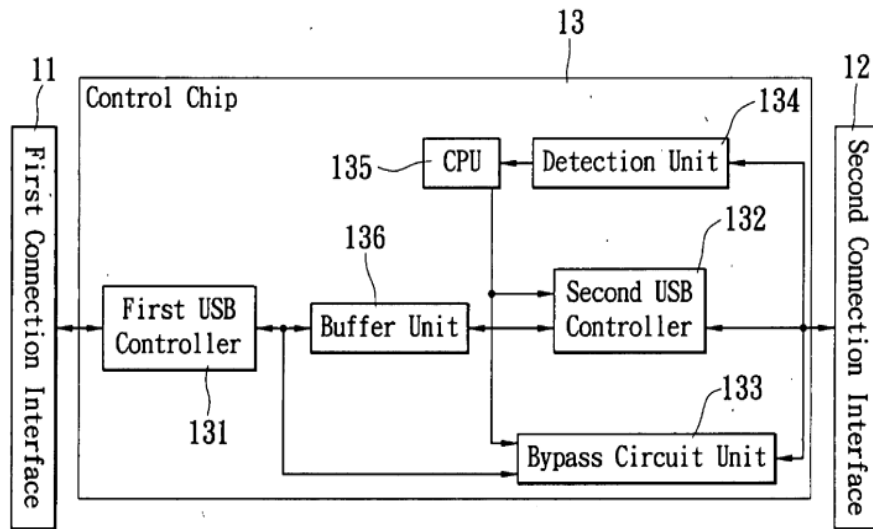


FIG. 5

Figure 5 above shows 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.* Upon detecting the type of device currently connected with second connection interface 12, detection unit 134 automatically operates to switch between a virtual host state and a virtual slave state. *Id.* ¶¶ 38, 39. Data transmission bridge device 1 “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. Chang II discloses that

by “automatically detecting the type of device connected (host or slave) the present invention can switch to the proper transmission path” and provide “direct bridging between two host device[s] for data transfer.” Ex. 1015 ¶ 21. And, “the control chip 13 can . . . switch to the bridge transmission path or the bypass path.” *Id.* ¶ 24.

3. Chutorash (Ex. 1029)

Chutorash describes a need for improved user interface features and/or connectivity features relating to vehicle control systems, remote sources, and/or portable devices. Ex. 1029, 1:34–39.

Figure 3 is a cutaway perspective view of a portable electronic device coupled to a vehicle control system and is reproduced below. *Id.* at 3:52–54.

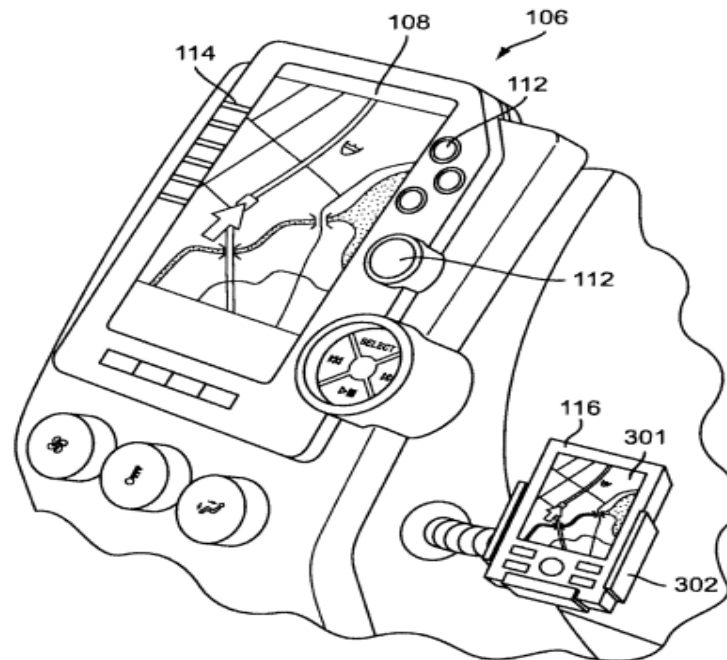


Figure 3 above shows portable electronic device 116 near and in communication with vehicle control system 106. *Id.* at 6:51–67. Vehicle control system 106 may comprise a media system, navigational system,

entertainment system, display system, communications systems, etc. *Id.* at 5:27–42.

Figure 27 depicts a block diagram of vehicle control system 106 including components for USB connectivity with a portable electronic device and is reproduced below. *Id.* at 4:58–61, 27:1–31.

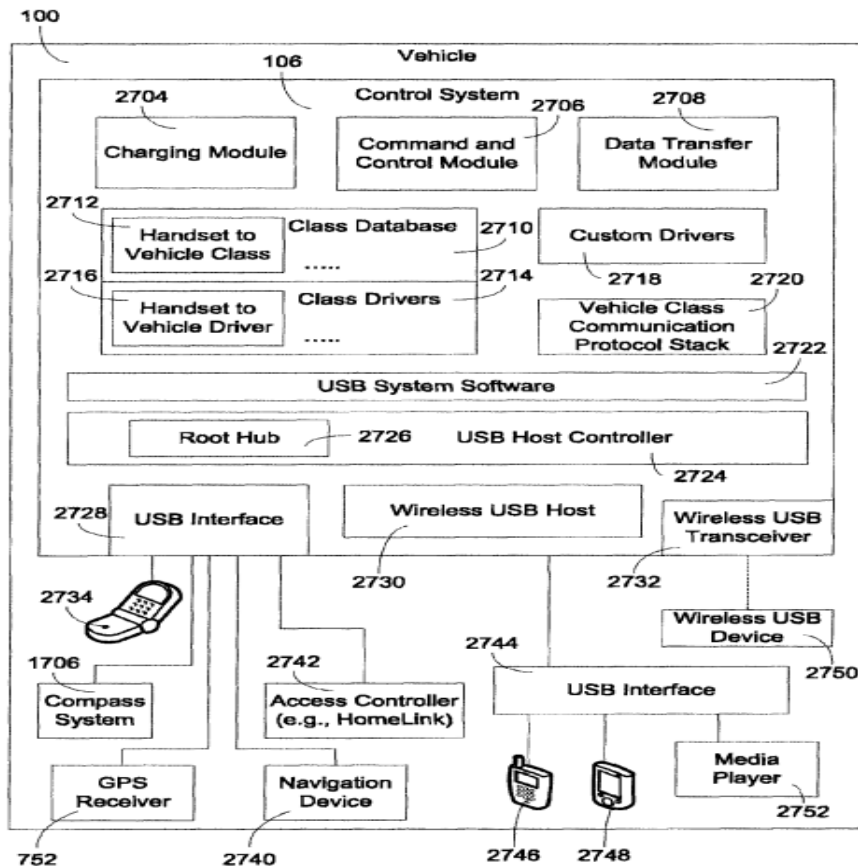


Figure 27 above shows a block diagram of vehicle control system 106 having USB connectors or interfaces 2728 and 2744 within vehicle 100. *Id.* at 27:1–31. Interface 2728 is embedded in vehicle control system 106 and interface 2744 is coupled to vehicle control system 106. *Id.*

E. Obviousness over Chang in view of Chang II (Ground 1)

Petitioner argues that claims 1–15 are obvious over Chang in view of Chang II. Pet. 5, 42–85. In support of its showing, Petitioner relies upon the Welch Declaration. *Id.* (citing Ex. 1013). We have reviewed Petitioner’s assertions and supporting evidence as well as Patent Owner’s assertions and supporting evidence and we determine based on the record before us that it is more likely than not that Petitioner would prevail in showing that at least claim 1 is rendered obvious in view of Chang and Chang II.

1. The Preamble

Independent claim 1 recites “[a] method, comprising.” Ex. 1011, 9:15.

Petitioner argues that, to the extent the preamble is limiting, Chang teaches these limitations.⁸ Pet. 52. According to Petitioner, the substantive analysis of Ground 1 renders it obvious. *Id.*

Patent Owner does not specifically respond to these arguments. *See generally* Prelim. Resp. Nonetheless, the burden of persuasion remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware, LLC*, 800 F.3d at 1378.

⁸ “In general, a preamble limits the invention if it recites essential structure or steps, or if it is ‘necessary to give life, meaning, and vitality’ to the claim.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). “[A]s a general rule preamble language is not treated as limiting.” *Aspex Eyewear, Inc. v. Marchon Eyewear, Inc.*, 672 F.3d 1335, 1347 (Fed. Cir. 2012) (citing *Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002)).

Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that Chang (and, thus, the combination of Chang with Chang II) teaches the subject matter of the preamble.

2. *Step 1a) first USB port for communication with a USB host*

Independent claim 1 further recites “providing a first USB port for communication with a USB host.” Ex. 1011, 9:16–17.

Petitioner argues that Chang teaches these limitations. Pet. 53 (citing Ex. 1014 ¶ 19; Ex. 1013 ¶ 222) (asserting that Chang’s explicit disclosure of “an uplink port 42 for being linked to a host,” teaches this step.)

Patent Owner does not specifically respond to these arguments. *See generally* Prelim. Resp.

Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that Chang (and, thus, the combination of Chang with Chang II) teaches the limitations in step 1a.

2. *Step 1b) second USB port for communicating with a consumer USB device*

Independent claim 1 further recites “providing a second USB port for communicating with a consumer USB device.” Ex. 1011, 9:18–19.

Petitioner argues that Chang teaches these limitations. Pet. 54–55 (citing Ex. 1014 ¶¶ 19–21, 42–44; Ex. 1013 ¶¶ 223, 224) (asserting that it would have been obvious to implement Chang’s downlink host port 50 as a dual-role port operating in either host or device mode).

Patent Owner does not contest this aspect of the Petition. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that

Chang (and, thus, the combination of Chang with Chang II) teaches the limitations in step 1b.

3. Step 1c) signal detection circuit for receiving USB signals from the consumer USB device

Independent claim 1 recites “providing a signal detection circuit for receiving USB signals from the consumer USB device via the second USB port.” Ex. 1011, 9:20–22.

Petitioner argues that Chang II teaches these limitations. Pet. 56–58 (citing Ex. 1015 ¶¶ 34, 38–40, 42–44; Ex. 1013 ¶¶ 226–230) (asserting that Chang II’s detection unit comprised in the control chip, upon receiving a signal from a device connected to a downstream port/second connection interface, automatically identifies the connected device type as a host or a slave device). *Id.* at 56–57. According to Petitioner, Chang II’s “detection results would control the mux select line” to detect either a host or device connection. *Id.* at 57.

Patent Owner does not contest this aspect of the Petition. *See generally* Prelim. Resp. Based on our review and consideration of the current record, we determine that Petitioner has sufficiently shown that Chang (and, thus, the combination of Chang with Chang II) teaches the limitations in step 1c.

4. Step 1d) Routing ...in a USB Host mode

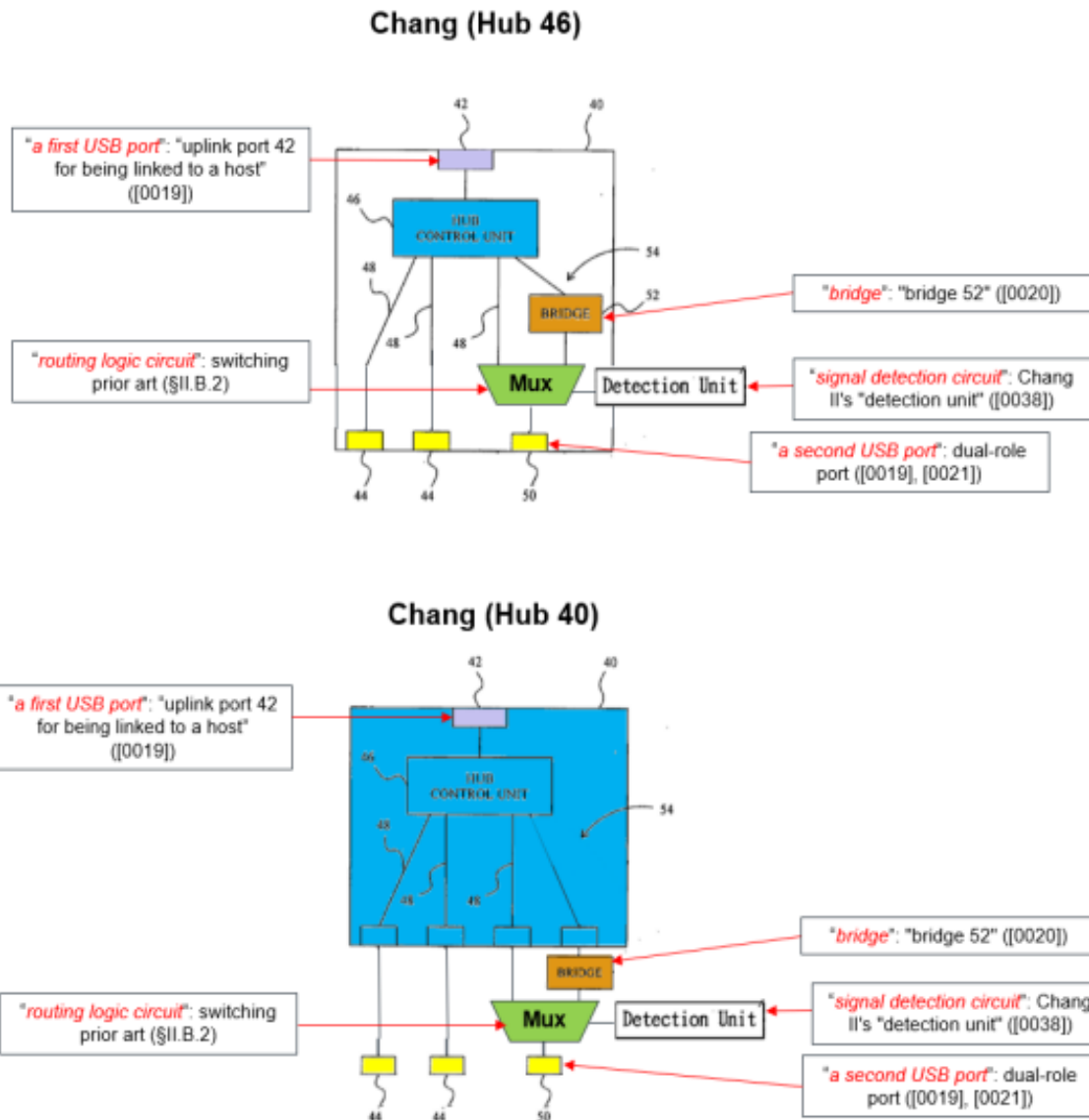
Independent claim 1 recites:

routing the USB signals emanating from the consumer USB device to the first USB port via a routing logic circuit connected directly to a USB bridge and a USB hub connected to the USB bridge in accordance with a determination by the signal

detection circuit that the consumer device is operating in a USB host mode, wherein the USB bridge includes a bridge controller, buffers, and a plurality of ports.

Ex. 1011, 9:23–30.

Petitioner contends a POSITA would have been motivated to implement dual-role ports by modifying Chang to include a switch (e.g., a multiplexer) to select the appropriate transmission path to connect a dual-role port (i) directly to the hub's upstream port (when the consumer product is in device mode, i.e., path 48 bypassing the bridge) or (ii) to the hub through the bridge (when the consumer product is in host mode, i.e., path 54). Pet. 59–66; *see also* Pet. 11–13, 32–39. Petitioner contends the alternative modifications of Chang to include a Mux as a routing logic circuit, reproduced below, would have been obvious:



The figures above show Petitioner's annotations and proposed modifications of Figure 3 of Chang with Chang II's detecting unit and a multiplexer as known in the art. Pet. 58. Petitioner contends each of these alternative Mux implementations renders this step obvious. Pet. 59. According to Petitioner, in these modifications, Chang's bridge 52 and hub control unit 46/ hub 40 correspond respectively to the claimed USB bridge and USB hub. Pet. 60–61 (citing Ex. 1014 ¶¶ 19, 20; Ex. 1013 ¶¶ 234–

237). Further, Petitioner asserts that, in this obvious modification, the “routing logic circuit” is a multiplexer “connected directly to a USB bridge” steering the USB product signals to the bridge to achieve Chang’s host-to-host communication or the multiplexer bypassing the bridge and providing the signals directly to the hub to achieve Chang’s host-to-device communication. *Id.* at 61–62 (citing Ex. 1013 ¶ 238). Further, Petitioner argues that connecting a USB product in host mode (“detection unit 134” automatically detecting the type of device connected (host or slave)” and a multiplexer “switch[ing] to the proper transmission path”), would have been obvious in view of Chang II and a POSITA’s knowledge. *Id.* at 62–64 (citing Ex. 1013 ¶¶ 238–245; Ex. 1015 ¶¶ 21, 38–44). Additionally, Petitioner contends Chang II’s control chip 13 corresponds to the claimed bridge controller and Chang II’s buffer unit 136 (shown in Figure 5) corresponds to the claimed buffer(s). Pet. 64–66 (citing Ex. 1013 ¶¶ 247–252; Ex. 1015 ¶ 21, 23). Petitioner argues Chang and Chang II disclose or render obvious that the bridge includes the claimed plurality of ports. Pet. 66.

Patent Owner argues Petitioner fails to point to any disclosure in either Chang or Chang II disclosing the claimed routing logic circuit. Prelim. Resp. 34–35. According to Patent Owner, Petitioner acknowledges that Chang uses dedicated ports, and does not contemplate using a routing logic circuit. *Id.* at 35 (citing Pet. 42). Likewise, Patent Owner argues that although Chang II contemplates purely as a conceptual matter switching between transmission paths, it does not disclose a discrete routing logic circuit that performs that function. *Id.* Consequently, Patent Owner submits

that “[a] POSITA would understand that switching between transmission paths could be performed by an element other than a routing logic circuit.” *Id.* (citing Ex. 2001 ¶¶ 60-61).

Based on the preliminary record, we are persuaded that Petitioner has presented sufficient evidence that would support a finding that the combined teachings of Chang with Chang II account for step 1d. As set forth above, in its contentions for this limitation, Petitioner proposes to modify Chang’s hub to incorporate Chang II’s teaching of a structure for switching (e.g., control chip) between the transmission paths associated with a selected communication type (host-to-host or host-to-device) identified by Chang II’s detecting unit. Pet. 59–61. Further, Petitioner argues that, because a POSITA would readily appreciate that the switching structure disclosed in Chang II is of the type that is well-known to be performed by a multiplexer, modifying Chang’s hub as suggested would be within the purview of the ordinarily-skilled artisan. *Id.* at 61–63. More particularly, Petitioner offers expert testimony to support that using a multiplexer as a switching structure (e.g., multiplexers crossbars, crosspoint) was well known to POSITA before 2013 for the specific purpose of routing USB communications emanating from a product to the appropriate path upon detecting the host/device mode of a product. *Id.* at 11–13 (citing Ex. 1013 ¶¶ 88–96; Ex. 1017 ¶¶ 56–57; Ex. 1040, 4:39–5:29; Ex. 1041, 1:20–36; Ex. 1055, 284–88; Ex. 1052, 3:7–20; Ex. 1053 ¶¶ 31–34; Ex. 1059; Ex. 1060; Ex. 1063 Ex. 1068).

Accordingly, we are not persuaded by Patent Owner’s argument that Petitioner’s rationale for combining the references as suggested is not supported by evidentiary evidence. Patent Owner’s assertion of hindsight is therefore a conclusion unsupported by objective evidence. *See Cheese Sys.*,

Inc. v. Tetra Pak Cheese & Powder Sys., Inc., 725 F.3d 1341, 1352 (Fed. Cir. 2013) (“In this regard, objective evidence operates as a beneficial check on hindsight.”).

Based on the preliminary record, we are persuaded that Petitioner’s proposed combination of Chang with Chang II is no more than a simple arrangement of old elements with each performing the same function it had been known to perform, yielding no more than what one would expect from such an arrangement. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). Accordingly, for purposes of institution, we determine that Petitioner has sufficiently shown that the combination of Chang with Chang II, and POSITA’s knowledge teaches the limitations in step 1d.

Motivation to Combine/Expectation of Success

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 one or more dual-role ports along with a switch and detection circuit to route the port(s) to the appropriate transmission path.

Pet. 42 (citing Ex. 1013 ¶¶ 175–202).

Petitioner argues “[a]s the ’643 patent admits, consumer products like smartphones with dual-role USB capabilities were gaining popularity before the 2013 priority date . . . 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 42–43. Petitioner further argues that common sense would dictate such a modification as “it would be impractical, and inconvenient at

best, to require consumers to understand when to switch connections between dedicated host- and device-ports when using a dual-role product.” *Id.* at 42 (citing Ex. 1013 ¶177). Petitioner additionally argues that modifying Chang to include dual-role ports would further Chang’s express goal of “easily establishing a connection between a computer and another computer.” *Id.* at 43 (citing Ex. 1014 ¶3). According to Petitioner, a POSITA would have had a high expectation of success in modifying Chang to include the dual-role ports because dual host ports and host/device detection were already well-known using commercially available components and well-understood signaling. *Id.* at 44 (citing Ex. 1011, 3:22–60; Ex. 1025, 3:10–32, 3:40–4:8, 7:34–40; Ex. 1029, 27:26–28; Ex. 1052, 3:21–50). Further Petitioner argues that, “it was already well-known to include switching functionality, *e.g.*, using mux(es), 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.’” *Id.* at 44–45 (citing Ex. 1017 ¶57; Ex. 1052, 3:7–20; Ex. 1053 ¶¶31–34).

Furthermore, Petitioner argues “a POSITA would have recognized Chang effectively provides a roadmap to implement the necessary switching to support dual-role ports” because Chang describes a transmission path 54 for host-to-host connection and a transmission path 48 for host-to-device connection. *Id.* at 44–46. Accordingly, Petitioner states:

In the context of Chang, a POSITA would have been motivated to implement dual-role ports by including a switch (*e.g.*, multiplexer) to connect a dual-role port directly to the hub’s upstream port (when the consumer product is in device mode, *i.e.*, path 48) or to the hub through the bridge (when the consumer product is in host mode, *i.e.*, path 54). Welch, ¶184. 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. *See* EX1015, [0027] (invention performs “similar[ly] to the commonly known USB HUB function” for host-to-device communication); *see also id.*, [0040] (“the control chip 13 at this time ***functions like a USB Hub chip***, merely acting with intermediate transmission function”) (emphasis added); Welch, ¶181.

Id. at 45–46.

Patent Owner argues a POSITA would not have been motivated to combine Chang and Chang II. Prelim. Resp. 24–32. Patent Owner contends “Petitioner relies on the general existence of dual-role devices and its expert’s say-so as the foundation for its hindsight-based combination.” *Id.* at 25. Patent Owner makes three arguments as to why a POSITA would have no reason to consider using Chang II to modify Chang. *Id.* at 26–32.

First, Patent Owner argues “[n]othing about Chang II suggests that it is intended for use with dual-role devices . . . [because] Chang II does not mention dual-role devices . . . instead consistently and exclusively refers to ***either*** a ‘host device 3’ or a separate and distinct ‘slave device 4’ as the possible downstream device.” *Id.* at 26–27. Patent Owner additionally argues Chang II’s disclosure that a second interface could use any of the connector types covered under the USB specification and the existence of Micro-AB connectors is insufficient to provide sufficient motivation to combine Chang and Chang II. *Id.* at 27–28.

Second, Patent Owner contends a POSITA would not have referenced Chang II to implement a dual-role port because Chang II does not consider a single device capable of operating in both host and device modes and Chang II expressly requires an adapter to swap between a USB connection used for hosts and a USB connection used for USB devices. *Id.* at 29–30.

Third, Patent Owner argues “[a] POSITA would not have considered using Chang II to modify Chang for the additional reason that adding steps and components to Chang as Petitioner proposes would only have complicated Chang’s design and frustrated Chang’s ‘express goal’ of ‘easily establishing a connection between a computer and another computer.’” *Id.* at 30–32.

Patent Owner additionally argues Petitioner’s justifications for combining Chang and Chang II ignore and mischaracterize Chang II’s disclosures. *Id.* at 32–38.

First, Patent Owner argues that three of Petitioner’s motivation-to-combine arguments fail to mention Chang II’s teachings at all and therefore fail as a matter of law. *Id.* at 33–34. According to Patent Owner, none of Petitioner’s arguments regarding how popularity, cost saving, and common sense would inure to the benefit of Chang’s USB hub to use a port with dual role capability refers to any teaching as in Chang II, let alone explains a why a POSITA would have combined elements from the references. *Id.*

Second, Patent Owner contends Petitioner’s arguments based on “common-sense” fail because the common-sense rationalization alone is legally insufficient to supply a motivation to combine Chang and Chang II and also because of lack of evidentiary support of cost savings. *Id.* at 35–36.

Third, Patent Owner contends Petitioner’s arguments that a POSITA would have been motivated to add dual-role ports to Chang to further Chang’s express goal of easily establishing a connection between a computer and another computer suffer from a failure of proof because Chang already provides a way to accomplish its express goal, and Chang does so by using dedicated ports for host-to-host and host-to-device communication.

Prelim. Resp. 37. In connection with this third argument, Patent Owner argues that Petitioner’s proposed modifications to Chang would only add to Chang’s existing USB hub steps and components (e.g., detection unit) borrowed from Chang II; they would complicate Chang’s solution, and would have also frustrated Chang’s express goal. *Id.* at 36–37.

Fourth, Patent Owner argues the Petition overstates Chang II’s passing mentions of a USB hub as a suggestion that Chang II’s bridge would be considered for improving Chang’s solution, which involved a hub and a bridge. Prelim. Resp. 37–38 (citing Ex. 1015 ¶¶ 27, 40). According to Patent Owner, the paragraphs of Chang II upon which the Petition relies do not suggest that the disclosed bridge could be used with a hub; they instead indicate that when using its “bypass path,” the “data transmission bridge device” provides an “intermediate transmission function (similar to the commonly known USB HUB function).” *Id.*

Based on the preliminary record, we are persuaded that Petitioner has presented a sufficient rationale to combine the teachings of Chang with Chang II, and POSITA’s knowledge with a reasonable expectation of success. We are persuaded that the proposed combination of Chang, Chang II and POSITA pertains to known elements performing their ordinary functions to predictably result in a USB hub module with dual-role port functionality using a multiplexer to automatically switch between a host-to-host mode or host to device mode via a different transmission path depending on whether a detected connecting device is operating as a host or as a device. *KSR*, 550 U.S. at 416. Although Patent Owner correctly argues that the proposed modification of Chang by adding thereto Chang II’s controller including the detection unit and the switching mechanism (e.g., a

well-known multiplexer), would add components to Chang's system, we do not agree with Patent Owner that such a modification would render Chang's resulting system more complex. Instead, we agree with Petitioner that the proposed modification of Chang would allow the resulting Chang's system to be more practical, efficient, and convenient as it would automate the switching between the transmission paths to operate in one of the two modes depending on the detected connecting device. For these same reasons, we do not agree with Patent Owner that the proposed modification would change Chang's principle of operation or intended purpose. Simply put, the proposed combination would enhance the operation of the dual port system already disclosed by Chang.

As noted above, based on the preliminary record, we are persuaded that Petitioner's proposed combination of Chang with Chang II, and POSITA's knowledge is no more than a simple arrangement of old elements with each performing the same function it had been known to perform, yielding no more than what one would expect from such an arrangement. Accordingly, Petitioner has sufficiently established for purposes of institution that a POSITA would have been motivated to make the proposed combination.⁹

⁹ It has been held that where the claimed subject matter involves more than the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement, a holding of obviousness *must* be based on "an apparent reason to combine the known elements in the fashion claimed." *KSR*, 550 U.S. at 417–18. That is, "there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *Id.* at 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Such reasoning can be based on interrelated teachings of multiple patents, the

For purposes of institution, we find that Petitioner’s rationale, which is supported by the testimony of Dr. Welsh, is a sufficient demonstration, at this stage, of a motivation to combine the references with a reasonable expectation of success. *KSR*, 550 U.S. at 417–18.

5. Step 1e) Routing .in a USB Device Mode

Independent claim 1 recites:

routing the USB signals emanating from the consumer USB device to the first USB port via the routing logic connected directly to the USB hub and thereby bypassing the USB bridge in accordance with a determination by the signal detection circuit that the consumer device is operating in a USB device mode, wherein the USB hub and USB bridge have different components and functionality.

Ex. 1011, 9:31–39.

Petitioner argues each of the Mux implementations described above renders this step obvious. Pet. 66–69. In particular, Petitioner argues that as in the discussion of step 1d) above, it would have been obvious to modify Chang’s hub with Chang II’s controller including a detector and a switching structure (e.g., a multiplexer as is well-known in the art by a POSITA) to teach step 1e). *Id.* With respect to the language “wherein the USB hub and USB bridge have different components and functionality” Petitioner contends this language is indefinite but the Board can nevertheless find claim 1 obvious if the hub and bridge are discrete components that perform (at a high level) different functions, because this is all the ’643 specification

effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art. *Id.* at 417–18.

discloses. Pet. 68–69. Petitioner argues Chang’s hub unit 46 is a separate/discrete component from bridge 52 and similarly, in the Chang (hub 40) mapping, the bridge is external to hub 40 and both the bridge and hub are discrete components. *Id.* at 69. Petitioner further contends in both Mux implementations the hub’s function is to connect the upstream host to multiple downstream products and the bridge provides a bridging function between two hosts (which occurs outside the hub). *Id.*

Patent Owner argues Petitioner fails to point to any disclosure in either Chang or Chang II disclosing the claimed routing logic circuit. Prelim. Resp. 34–35.

As discussed in step 1d) above, based on the preliminary record, we are persuaded that Petitioner’s proposed combination of Chang with Chang II, and POSITA’s knowledge is no more than a simple arrangement of old elements with each performing the same function it had been known to perform, yielding no more than what one would expect from such an arrangement. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). Accordingly, for purposes of institution, we determine that Petitioner has sufficiently shown that Chang with Chang II, and POSITA’s knowledge are properly combined and supported with sufficient motivation with a reasonable expectation of success to teach the limitations in step 1e. *KSR*, 550 U.S. at 417–18.

Conclusion Regarding Independent Claim 1

For the foregoing reasons, we determine that Petitioner has established a reasonable likelihood of prevailing on its assertion that

independent claim 1 would have been obvious in view of the combination of Chang, Chang II, and POSITA's knowledge.

6. Claims 2–15

Petitioner contends that independent claims 5 and 10 bear many similarities to independent claim 1 and both Mux implementations satisfy them for largely the same reasons as claim 1. Pet. 75–77, 79–82. Accordingly, Petitioner argues that independent claims 5 and 10 would have been likewise obvious over the combination of Chang, Chang II, and POSITA's knowledge. *Id.* Further, Petitioner contends that claims 2–4, 6–9, and 11–15, which depend directly or indirectly from independent claim 1, 5, and 10, respectively, would have been obvious over the combination of Chang, Chang II, and POSITA's knowledge. Pet. 69–74, 77, 78, and 82–85.

We have reviewed Petitioner's showing as to the additional limitations of claims 2–15, and find that Petitioner has sufficiently shown that the combination of Chang and Chang II teaches each of the limitations of these claims at this stage of the proceeding. *Id.* at 69–85. We further note that Patent Owner does not separately address the patentability of these claims beyond its arguments as to independent claim 1, addressed above. *See* Prelim. Resp. We determine, on the current record and for purposes of institution, that the information presented in the Petition demonstrates a reasonable likelihood that Petitioner would prevail in its obviousness contentions regarding claims 2–15.

As we preliminarily conclude that Petitioner demonstrates a reasonable likelihood of prevailing with respect to its obviousness challenge to independent claim 1 as rendered obvious by Chang, Chang II, and

POSITA's knowledge, we institute review on all challenged claims on all grounds set forth in the Petition, including Petitioner's challenge to claims 2–15 as rendered obvious by Chang and Chang II. *See* 37 C.F.R. § 42.208(a).

F. Obviousness over Chang in view of Chang II, and Chutorash (Ground 2)

Petitioner argues that dependent claims 2, 7, and 13 are obviousness over Chang in view of Chang II and Chutorash. Pet. 5, 85–88. Dependent claim 2 recites “the USB host is embedded in an infotainment system.” Ex. 1011, 9:40–41. Dependent claims 7 and 13 recite similar language. *Id.* at 10:10–12, 10:51–53. Petitioner contends Chutorash discloses the subject matter in these dependent claims. Pet. 88.

Because we determine Petitioner has made a sufficient showing to institute based on Ground 1, we also institute on Petitioner's Ground 2 challenge to claims 2, 7, and 13 as rendered obvious by Chang, Chang II, and Chutorash. *See* 37 C.F.R. § 42.208(a).

G. Indefiniteness (Grounds 3 to 6)

Petitioner argues four different grounds based on indefiniteness. Pet. 88–102. Patent Owner argues the challenged claims are not indefinite. Prelim. Resp. 41–59. Although we institute review on all challenged claims on all grounds set forth in the Petition, we make the following remarks regarding Petitioner's indefiniteness challenges (grounds 3–6). We note that these determinations serve to merely give notice to the parties regarding claims indefiniteness. These remarks are not intended to preclude the parties from arguing their respective positions regarding claims indefiniteness

during trial. A final determination as to claims indefiniteness will be made at the close of the proceeding, after any hearing, based on all the evidence of record. We address each of these grounds in turn.

1. “the USB hub and USB bridge have different components and functionality” (Ground 3, Claims 1–15)

Petitioner argues the language “the USB hub and USB bridge have different components and functionality” in each of independent claims 1, 5, and 10 renders claims 1–15 indefinite and therefore invalid under § 112(b). Pet. 88–92. Petitioner argues the specification and file history provide no guidance on what the claimed difference(s) must be. *Id.* at 89, 91–92. Petitioner further argues the claim language does not say the USB hub and USB bridge “are” different components, only that they “have” different components “[b]ut even if the limitation were read to refer to the ‘type’ of component, it still begs the question whether the limitation requires only the hub and the bridge have one different component or must have all different components (mutually exclusive sets).” *Id.* at 89–90. Petitioner further argues “[o]n the other hand, ‘have different components’ could mean the hub and bridge are made with different physical components.” *Id.* at 90.

Petitioner additionally argues that the “different . . . functionality” is even more indefinite because from one perspective the hub and bridge both function to connect ports but “drilling down on how the hub and bridge function to connect ports will result in some differences . . . at what level of detail does the claim require defining the ‘functionality’?” *Id.* at 90–91.

Patent Owner argues this language “is non-technical, providing general descriptive language that means simply what it says: that the claimed USB bridge and the claimed USB hub must have different components and

different functionality from each other.” Prelim. Resp. 42. Patent Owner argues Petitioner’s argument “is a complaint about the breadth of the claim, not about what meaning the word ‘different’ imparts.” *Id.* Patent Owner further argues this language was added by the Examiner and is presumed not indefinite.¹⁰ *Id.* at 43. Patent Owner argues “any difference in components and functionality would satisfy the claim language . . . [t]he specification explains that the bridge performs a host of functions that the hub does not.” *Id.* at 44.

Our review

A patent claim is indefinite and therefore invalid under § 112(b) if, when “read in light of the specification delineating the patent, and the prosecution history, [the claim] fail[s] to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014).

The ’643 patent indicates that the USB hub is an integrated circuit including at least an upstream USB port coupled to a plurality of downstream USB ports via a USB digital logic for relaying signals between the host port and consumer ports within a vehicle. Ex. 1011, 2:33–41, 5:56–67, Fig. 4. The ’643 patent further indicates that the USB bridge is also an integrated circuit configured for controlling the switching device. *Id.* at 6:3–5. Specifically, when the consumer device is acting as USB Host, “the USB

¹⁰ Patent Owner incorrectly cites pages 107 and 108 of Exhibit 1012 (the ‘643 file history). Pages 107 and 108 are contained in a first Notice of Allowance dated January 10, 2023. Ex. 1012, 102–113. Thereafter a Request for Continued Examination was filed April 10, 2023 (*id.* at 175–76), and a second Notice of Allowance was issued May 2, 2023 (*id.* at 197–209). The second Notice of Allowance contains the language at issue.

bridge processes the USB packets from the consumer port and provides them to the USB hub, thereby rendering the consumer device compatible with the vehicle's embedded USB Host.” Whereas, when the consumer device is acting as a USB Device, “the USB Bridge controls the switching device such that the switching device provides the USB signaling directly to the USB Hub, bypassing the Bridge.” *Id.* at 6: 5–17.

A POSITA, having read the ’643 patent, would have readily been apprised that the USB hub and the USB bridge are different integrated circuits that include different components and perform different functions within the USB hub module. Although the ’643 patent does not particularly enumerate the components included in the USB bridge, the POSITA would be able to ascertain the specifications of such a typical USB bridge from widely available sources. Further, the POSITA would likewise appreciate that the USB hub serves to relay packets between the different ports within the USB hub module, and the USB bridge serves to control host-to-host and host-to-device communications within the module.

2. Routing Logic Circuit (Ground 4, Claims 1–15)

Petitioner argues that the term “routing logic circuit” in each of independent claims 1, 5, and 10 is a coined term without a well-understood meaning. Pet. 92. Petitioner argues the functions recited in the claims for the routing logic circuit do not clarify the boundaries/structure of that circuit. Pet. 92–93. Petitioner additionally contends dependent claim 3¹¹ “only confuses the matter further by reciting ‘a USB routing switch’ performs the

¹¹ Dependent claim 3 recites “wherein the bypassing the USB bridge is performed by a USB routing switch.” Ex. 1011, 9:42–43.

claimed routing” because it is unclear whether a “routing logic circuit” is the same as, or different than, a “USB routing switch.” *Id.* at 93. Petitioner further argues the specification provides no clarity because the specification never uses the term “routing logic circuit” and nothing in the specification explains what circuit implements the logic. Petitioner concludes “[b]ecause the intrinsic evidence provides no objective boundaries for the coined term ‘routing logic circuit,’ it is indefinite.” *Id.* at 94.

Patent Owner argues the term “routing logic circuit” is not indefinite because a POSITA would understand, based on the plain language of the term, the surrounding claim context, and the specification, that this term refers to a class of structures that directs signals from one input/output interface to another. Prelim. Resp. 45. Patent Owner argues the claims set forth the functions performed by the “routing logic circuit” which “adds context to identify the class of structures to which the term applies, namely, circuits that route signals.” *Id.* at 45–46. Patent Owner additionally argues “the specification goes on to disclose multiple configurations in which routing logic circuitry may be implemented. (Ex. 2001, ¶ 103.) For example, “routing logic circuitry may be a discrete device, it may be present inside a USB multiplexing switch, or it may include circuitry to implement ‘USB routing logic.’”¹² Prelim. Resp. 46. Patent Owner further argues that this claim language was added by the Examiner and therefore there is a presumption that the language is not indefinite. *Id.*¹³ Patent Owner

¹² Patent Owner cites column 4, lines 35–38 and lines 40–43, and Figures 4 to 6 of the ’643 patent as well as the Houh Declaration.

¹³ As discussed *supra*, Patent Owner cites the wrong Notice of Allowance. The correct Notice of Allowance is at pages 197–209 of Exhibit 1012.

concludes “a POSITA reading the claim in light of the specification and prosecution history would be informed, with reasonable certainty, about the scope of the invention.”

Our review

The ’643 patent indicates that “[t]he USB Hub Module also includes a switching device (such as USB analog multiplexing switches for example) that is configured to route each consumer port to either the Bridge or the Hub.” Ex. 1011, 4:40–43. As depicted in Figure 4 of the ’643 patent, the switching device is directly coupled to the USB bridge and the USB hub to route signals emanating from the consumer device to the USB hub. *Id.* at 6:5–8. Therefore, a POSITA, having read the ’643 patent, would have readily appreciated that the claimed “routing logic circuit” is directed to the switching device because the routing function of the switching device as provided in the ’643 patent comports with the same function of the “routing logic circuit” as recited in independent claims 1, 5, and 10.

3. Detection Circuit (Ground 5, Claims 1–9)

Petitioner contends independent claims 1 and 5 both recite “a signal detection circuit” that receives USB signals from an attached consumer product and determines if the product is in host or device mode. Pet. 94. Petitioner argues the term “signal detection circuit” is a means-plus-function claim term under § 112(f) because it recites a nonce term—and no structure—to perform the functions of receiving signals and determining whether a connected USB product is in host or device mode. *Id.* Petitioner further argues in the term “signal detection circuit” both “signal detection” and “circuit” are used generically and do not connote structure but instead

indicate some type of detection function. *Id.* at 96–97. Petitioner additionally argues “the ’643 patent fails to disclose ***any structure whatsoever*** for determining host/device status, much less link that structure to the ‘signal detection circuit.” *Id.* at 98. Petitioner argues that because the ’643 specification fails to describe any corresponding structure, claims 1 and 5 (and their dependent claims) are indefinite. Pet. 94.¹⁴

Patent Owner contends that because “signal detection circuit” does not recite the word “means,” it is presumed that § 112(f)¹⁵ does not apply. Prelim. Resp. 47. Patent Owner argues the term “circuit” is well-understood by a POSITA as conveying structure. *Id.* at 48 (citing Ex. 2015, Wiley Electrical and Electronics Engineering Dictionary). Patent Owner additionally argues that courts have repeatedly held that “circuit” connotes structure and because the claims do not recite the word “means” or a similar nonce term, it is presumed that § 112(f) does not apply. *Id.* at 48–49. Patent Owner further argues Petitioner has not met its burden to rebut the presumption that this term is not subject to § 112(f). *Id.* at 49–52. Patent Owner argues the adjectival qualification “signal detection” before “circuit” indicates the circuit operates to detect signals and adds further structure by describing the operation of the circuit. *Id.* at 50–51. Additionally, Patent Owner contends the surrounding claim context further describes the signal detection circuit’s operation, which provides sufficient detail to connote structure to a POSITA. *Id.* at 51–52.

¹⁴ Petitioner states for purposes of prior art analysis the Petition considers “signal detection circuit” to be any circuit that performs the claimed functions. Pet. 99.

¹⁵ Patent Owner refers to the pre-AIA § 112 ¶ 6 instead of the AIA § 112(f). For consistency and correctness, we refer to § 112(f).

Our Review

The '643 patent indicates that “[t]he USB Hub Module is configured such that signals received from at least one USB port are received by the switching device, and the switching device routes the signals to the USB bridge or the USB Hub.” Ex. 1011, 6:5–8. The '643 patent appears to suggest that signals emanating from the consumer device (detected to be acting as a host or a device) are first processed by the switching device/routing switch, which routes them to the bridge or the USB hub for further action. *Id.* at 6:8–16. However, the '643 patent provides no discussion regarding the claimed signal detection, let alone identifying a particular circuit for performing such function. Accordingly, we note that the POSITA, having read the '643, would not have been apprised of the scope of the “signal detection circuit” as recited in independent claims 1, 5, and 10. *See* 37 C.F.R. § 42.204(b)(3).

4. *The USB switch includes the signal detection circuit (Ground 6, claims 4, 9, and 15)*

Petitioner states dependent claims 4 and 9 recite “wherein the USB routing switch includes the signal detection circuit” and dependent claim 15 similarly recites “the USB routing switch determines whether the second USB signal emanates from a USB device.” Pet. 99. Petitioner contends “[c]laim 15 would be understood to require that the switch includes the signal detection circuit.” *Id.* Petitioner argues “[t]he claim language, specification, and file history do not provide reasonable clarity on what it means for the ‘routing switch’ to include ‘the signal detection circuit’” and that claims 4, 9, and 15 are indefinite. *Id.* Petitioner argues the claim language (namely, “includes”) indicates that the “signal detection circuit” is

inside the “switch” or that the “switch” uses the same circuitry as the “signal detection circuit” and that this makes little sense to a POSITA, because the “switch” and “signal detection circuit” would be understood to be two separate, physical collection of transistors. *Id.* at 99–100. Further, Petitioner argues claim 15 is nonsensical because it refers to the “routing switch” performing the function of “determin[ing] whether the second USB signal emanates from a USB device” because a detection circuit performs this function, not a switch. *Id.* at 100–101. Petitioner concludes “how ‘the switch includes the signal detection circuit’ is not reasonably certain to a POSITA and the specification and file history fail to provide the requisite clarity.” *Id.* at 102.

Patent Owner argues the word “includes” itself has a straightforward, plain meaning and based on its plain meaning, a POSITA would understand the claim language requires simply that the USB routing switch comprises the signal detection circuit as part of a whole or group. Prelim. Resp. 53–54. Patent Owner argues the surrounding claim language and prosecution history confirm this meaning. *Id.* at 54–55. Further, Patent Owner argues Petitioner’s contentions relate to implementation-level details, which do not give rise to indefiniteness. *Id.* at 55–58. Additionally, Patent Owner argues Petitioner’s contention that its argument extends to claim 15 is baseless because neither claim 15 nor any of the claims from which claim 15 depends recite a signal detection circuit.

Our Review

As noted above, although not expressly discussed, the ’643 patent appears to suggest that the USB switching device/routing switch detects signals emanating from the consumer device. However, the ’643 patent

offers no detail regarding such possible signal detection. Clarification is needed on this point as the '643 patent does not provide sufficient details that would enable the POSITA to ascertain the additional functions of the routing switch beyond the routing functions described in the patent.

H. Lack of Written Description Support (Ground 7, Claims 4, 9, 15)

Petitioner argues the language “wherein the USB routing switch includes the signal detection circuit” in claims 4 and 9 lack written description support for reasons similar to those discussed *supra* in connection with Petitioner’s indefiniteness arguments regarding this language in Ground 6. Pet. 102–103. Petitioner cites claim 15 but does not make any arguments for claim 15. *Id.* Petitioner contends “the specification fails to demonstrate the inventor possessed a ‘switch [that] includes the signal detection circuit.’” *Id.* at 103.

Patent Owner argues the field of USB is not an unpredictable art. Prelim. Resp. 60–63. Citing the Houh Declaration, Patent Owner argues “[a] POSITA would understand, based on the specification’s disclosure and his or her general understanding of routing switches and signal detection circuits in the field of USB, that the specification sufficiently describes this term.” *Id.* at 62. Patent Owner additionally argues that Petitioner’s arguments for claims 4 and 9 do not apply to claim 15 because claim 15 does not recite the signal detection circuit language of claims 4 and 9. *Id.* at 60.

Our Review

To satisfy the written description requirement, a patent Specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed

invention. *Moba, B.V. v. Diamond Automation, Inc.*, 325 F.3d 1306, 1319 (Fed. Cir. 2003). An applicant may show possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, figures, diagrams, and formulas that fully set forth the claimed invention. *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997).

As noted in our discussion above, the '643 patent does not provide sufficient details about the switching device/routing switch that would enable the POSITA to ascertain additional functions that it may perform beyond the disclosed routing function. Although the '643 patent appears to imply that signals emanating from the consumer device (detected to be acting as a host or device) are first processed by the routing switch before being forwarded to the bridge or the hub for further processing, it is silent as to where the signal detection takes place and what particular device performs such function. Accordingly, the POSITA would not be able to ascertain that the inventor of the '643 patent had possession of the limitation that the USB routing switch includes a signal detection circuit.

IV. CONCLUSION

For the foregoing reasons, we determine that the information presented establishes that it is more likely than not that Petitioner would prevail in showing that at least one challenged claim of the '643 patent is unpatentable. At this preliminary stage, we have not made a final determination with respect to the patentability of the challenged claims or any underlying factual and legal issues.

Accordingly, post-grant review is instituted as to all challenged claims and all proposed grounds of unpatentability. *See* 37 C.F.R. § 42.208(a).

V. ORDER

Accordingly, it is:

ORDERED that pursuant to 35 U.S.C. § 324(a) and 37 C.F.R. § 42.4(a), a post-grant review of claims 1–15 of the '643 patent is instituted with respect to the grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 324(d) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which commences on the entry date of this decision.

PGR2024-00011
Patent 11,681,643 B2

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