

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZTE (USA) INC.,
Petitioner,

v.

FUNDAMENTAL INNOVATION SYSTEMS INTERNATIONAL LLC,
Patent Owner.

Case IPR2018-00111
Patent 8,624,550 B2

Before RAE LYNN P. GUEST, JO-ANNE M. KOKOSKI, and
JON B. TORNQUIST, *Administrative Patent Judges*.

TORNQUIST, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

ZTE (USA) Inc.¹ filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 1–18 of U.S. Patent No. 8,624,550 B2 (Ex. 1001, “the ’550 patent”). Fundamental Innovation Systems International LLC (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 12.

Upon consideration of the Petition, the Preliminary Response, and the parties’ evidence, we determined that Petitioner had demonstrated a reasonable likelihood that it would prevail with respect to claim 10 of the ’550 patent. Paper 16, 22 (“Decision to Institute” or “Dec. on Inst.”). Thus, pursuant to the Supreme Court’s decision in *SAS Institute Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018), and USPTO Guidance,² we instituted review of all challenged claims on all challenged grounds. *Id.*

Following institution of trial, Patent Owner filed a Patent Owner Response (Paper 33, “PO Resp.”), Petitioner filed a Reply (Paper 42, “Pet. Reply”), and Patent Owner filed a Sur-Reply (Paper 54, “Sur-Reply”). In support of their respective positions, Petitioner relies on the testimony of

¹ The Petition was filed by ZTE (USA) Inc., Samsung Electronics Co., Ltd, and Samsung Electronics America, Inc. Pet. 1. LG Electronics, Inc., LG Electronics U.S.A. Inc., LG Electronics Mobilecomm U.S.A. Inc., LG Electronics Mobile Research U.S.A. LLC, and LG Electronics Alabama, Inc. were subsequently joined to the proceeding. Paper 22. The proceeding was subsequently terminated with respect to the Samsung and LG petitioners. Paper 27; Paper 40. Thus, ZTE (USA) Inc. is the only remaining Petitioner in this proceeding.

² In accordance with USPTO Guidance, “if the PTAB institutes a trial, the PTAB will institute on all challenges raised in the petition.” See USPTO, Guidance on the Impact of SAS on AIA Trial Proceedings (April 26, 2018) (available at <https://www.uspto.gov/patents-application-process/patent-trial-and-appeal-board/trials/guidance-impact-sas-aia-trial>) (“USPTO Guidance”).

Mr. James T. Geier (Ex. 1009), and Patent Owner relies on the testimony of Dr. Kenneth Fernald (Ex. 2011) and Mr. Steven Rogers (Ex. 2012).

An oral hearing was held on February 5, 2019, and a transcript of the hearing is included in the record (Paper 59, “Tr.”).

A. Related Proceedings

The parties identify Civil Action Nos. 2:17-cv-00145-JRG, 2:16-cv-1424-JRG-RSP, and 2:16-cv-01425-JRG-RSP, pending before the U.S. District Court for the Eastern District of Texas, and Civil Action No. 3:17-cv-01827-N, pending in the U.S. District Court for the Northern District of Texas, as related matters. Pet. 1; Paper 10, 1. The parties further note that the ’550 patent was the subject of IPR2018-00110, which was not instituted. Pet. 1; Paper 10, 2.

B. Overview of the USB 2.0 Specification and USB-Compliant Cables

Cables compliant with the USB 2.0 specification (“USB specification”) have four conductors: VBUS, D+, D-, and GND. Ex. 1008, 17–18, 87;³ Ex. 1009 ¶¶ 34–35. The VBUS and GND conductors of the USB cable are used to deliver power to devices and the D+ and D- conductors carry communication signals between a USB host and a connected device. Ex. 1008, 17–18, 90; Ex. 1009 ¶ 35; Ex. 1001, 7:11–16.

Pursuant to the USB specification, when a USB device is attached to a host, the host uses an 8-step process known as bus enumeration to identify and manage the necessary device state changes. Ex. 1008, 243–244; Ex. 1009 ¶ 37. As part of this process, “[t]he host typically requests

³ Our citations are to the original page numbers in the lower left and right corners of the document.

configuration information from the USB device to determine the device's capabilities." Ex. 1008, 244. "Based on the configuration information" received, "and how the USB device will be used, the host assigns a configuration value to the device." *Id.* The device is then in the configured state and can "draw the amount of VBUS power described in its descriptor for the selected configuration." *Id.* ("From the device's point of view, it is now ready for use.").

The USB specification explains that "[a] USB device must be configured before its function(s) may be used," and prior to configuration USB devices are limited to drawing one unit load or less (100 mA) from VBUS. *Id.* at 243–244 ("The USB device is now in the Default state and can draw no more than 100 mA from VBUS."); Ex. 1009 ¶ 38. After configuration, a USB device can draw up to 500 mA of current at up to 5.25 volts. Ex. 1008, 178; Ex. 1009 ¶¶ 38–39.

C. The '550 Patent

The '550 patent is directed to "a USB adapter for providing a source of power to a mobile device through a USB port." Ex. 1001, 2:34–36. In particular, the '550 patent discloses a system wherein a device "that follows the USB specification when coupled to a typical USB host via its USB port can be informed that the USB adapter" has been coupled to a device that can "draw power without regard to the USB specification and the USB specification imposed limits." *Id.* at 8:21–26.

Figure 2 of the '550 patent is reproduced below:

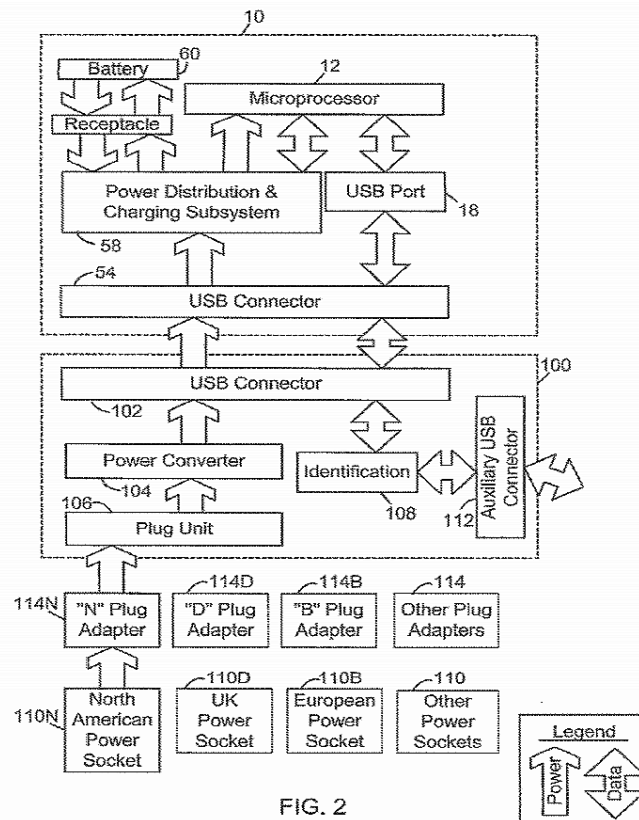


Figure 2 is a schematic diagram of a USB adapter coupled to an exemplary mobile device. *Id.* at 3:35–36. As shown in Figure 2, USB adapter 100 comprises primary USB connector 102, power converter 104, plug unit 106, identification subsystem 108, and auxiliary USB connector 112. *Id.* at 6:63–66, 7:5–8. The '550 patent discloses that when USB connector 102 of USB adapter 100 is connected to mobile device 10 via mating USB connector 54 of mobile device 10, identification subsystem 108 of USB adapter 100 provides an identification signal to mobile device 10 indicating that the power source is not a USB limited source. *Id.* at 7:9–11, 8:21–29, 9:8–13 (noting that an identification signal may notify the mobile device that it “is connected to a power source that is not subject to the power limits imposed by the USB specification”). This identification signal “could be the

communication of a single voltage on one or more of the USB data lines, different voltages on the two data lines, a series of pulses or voltage level changes, or other types of electrical signals.” *Id.* at 8:29–33. “The preferred identification signal,” however, “results from the application of voltage signals greater than 2 volts to both the D+ and D- lines in the USB connector.” *Id.* at 9:26–28. The ’550 patent explains that, by providing an appropriate identification signal, the mobile device 10 can “forego the enumeration process and charge negotiation process” set forth in the USB specification “and immediately draw energy from the USB power adapter” at a desired rate. *Id.* at 9:65–10:3.

D. Illustrative Claims

Petitioner challenges claims 1–18 of the ’550 patent. Independent claims 1 and 10 are illustrative of the challenged claims, and are reproduced below:

1. An adapter comprising:
a USB VBUS line and a USB communication path,
said adapter configured to supply current on the VBUS line
without regard to at least one associated condition specified in a
USB specification.

Ex. 1001, 12:8–12.

10. An adapter comprising:
a USB VBUS line and a USB communication path,
said adapter configured to supply current on the VBUS line
without regard to at least one USB Specification imposed limit.

Id. at 12:32–36.

E. Instituted Grounds of Unpatentability

We instituted trial to determine whether claims 1–18 of the '550 patent are unpatentable in view of the following grounds (Dec. on Inst. 6, 22):

Reference(s)	Basis	Claims Challenged
Rogers ⁴	§ 103	1–3, 9–12, and 18
Rogers and Shiga ⁵	§ 103	4–8 and 13–17

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are construed according to their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2018);⁶ *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). In determining the broadest reasonable construction, we presume that claim terms carry their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). A patentee may define a claim term in a manner that differs from its ordinary meaning; however, any special definitions must be set forth in the specification with reasonable clarity, deliberateness, and precision. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

⁴ US 6,556,564 B2, issued April 29, 2003 (Ex. 1005).

⁵ US 6,625,738 B1, issued September 23, 2003 (Ex. 1006).

⁶ A recent amendment to this rule does not apply here, because the Petition was filed before November 13, 2018. *See Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board*, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (to be codified at 37 C.F.R. pt. 42).

The parties dispute the meaning of two claim phrases, which we address below.

to supply current . . . without regard to at least one associated condition specified in a USB Specification

Claim 1 requires that the adapter is “configured to supply current on the VBUS line without regard to at least one associated condition specified in a USB specification.” Ex. 1001, 12:10–12. In the Decision to Institute, we construed the “associated condition” limitation of claim 1 to be a condition associated with the supply of current on the VBUS line, and not a condition associated with, for example, voltage. Dec. on Inst. 8.

Patent Owner agrees with our preliminary construction, asserting it “comports with the plain language of the claim in which the ‘associated condition’ refers back to the phrase ‘supply current on the VBUS line.’” PO Resp. 12.

Petitioner agrees the word “associated” in claim 1 refers back to the supply of current on the VBUS line, but contends the Board erred in concluding that a voltage limit is not a condition “associated” with the supply of current. Pet. Reply 3. Petitioner reasons that “current is supplied at a particular voltage,” and “[a]ll other things being equal, Ohm’s law would have told those of skill in the art that limiting the supply voltage necessarily would also limit the current.” *Id.* Thus, Petitioner contends a voltage limit “is a condition ‘associated’ with the supply of current.” *Id.*

The claims and written description of the ’550 patent indicate that the USB specification’s requirement for enumeration and its “current limit” are conditions associated with the supply of current on the VBUS line. Ex. 1001, 8:15–26 (explaining that “[t]he USB specification specifies a process for transferring energy across the USB called enumeration and limits

the electrical current that can flow across the USB” and when an appropriate signal is provided “the device 10 can now draw power without regard to the USB specification and the USB specification imposed limits”), 12:8–16 (dependent claim 2 requiring that the associated condition “is a current limit”). The intrinsic record does not, however, provide clear guidance as to what other limits or conditions specified in the USB specification are “associated” with the supply of current on the VBUS line. Thus, we must look to the USB specification to determine what conditions set forth therein are associated with the supply of current on the VBUS line.

Dr. Fernald testifies that “current and voltage are independent variables” in the USB specification and “voltage levels do not influence the limits set in the specification for current.” Ex. 2011 ¶ 49; Ex. 1008, 178 (separately listing the “Min.” and “Max.” for “Supply Voltage” and “Supply Current”). With respect to Petitioner’s “[a]ll other things being equal argument,” Dr. Fernald testifies that there are no separate power limits set out in the USB specification, and for a given power level, for example 2.5 Watts, even if the voltage is set at 4.4V—the lower limit specified in the USB specification—the current still cannot exceed 500 mA. PO Resp. 16; Sur-Reply 5; Ex. 2011 ¶¶ 49, 51. Petitioner presents no credible evidence or argument to counter Dr. Fernald’s factually-supported testimony. Thus, there is insufficient evidence to conclude that the voltage limit specified in the USB specification is an “associated condition” regarding the supply of current on the VBUS line.

As noted by Petitioner, every current has a voltage. Pet. Reply 3. Claim 1, however, is directed to conditions *specified in a USB specification* that are associated with the supply of current on the VBUS line, and for the

reasons discussed above, Petitioner presents insufficient evidence that a limit on voltage would affect whether, or how much, current could be supplied on the VBUS line under the USB specification. *See, e.g.*, Tr. 28:10–16, 29:6–14, 57:18–58:24 (noting that there is no evidence of record demonstrating that exceeding a voltage limit would prevent supplying current on the VBUS line). Accordingly, we are not persuaded that the scientific coupling of current and voltage mandates that any condition associated with voltage specified in the USB specification is also a condition associated with the supply of current on the VBUS line specified in the USB specification.

Claim 2 depends from independent claim 1 and further requires that “said associated condition is a current limit.” Ex. 1001, 12:13–14. As noted by Petitioner, this suggests that the associated condition of claim 1 is broader than “a current limit.” *See Philips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (“[T]he presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.”); Pet. Reply 4. Patent Owner persuasively demonstrates, however, that the USB specification specifies multiple conditions that are associated with the supply of current on the VBUS line, including “a current limit,” a condition on the “current flow direction,” and a time limit for providing current. PO Resp. 12, 17 (citing Ex. 2001 ¶¶ 48, 56); Sur-Reply 7. Petitioner does not contest these factual assertions. Pet. Reply 4. Thus, we are not persuaded that the doctrine of claim differentiation suggests that claim 1 encompasses a voltage limit.⁷ Ex. 1001, 12:10–14.

⁷ Because Patent Owner demonstrates that there are multiple limits related to supplying current on the VBUS line, this conclusion applies equally to a

In view of the foregoing, we maintain our previous construction and construe the “associated condition” limitation of claim 1 to be a condition associated with the supply of current on the VBUS line, and not a condition associated with, for example, voltage.

to supply current . . . without regard to at least one USB Specification imposed limit

Claim 10 requires that the adapter is “configured to supply current on the VBUS line without regard to at least one USB Specification imposed limit.” Ex. 1001, 12:34–36. In the Institution Decision, we construed this claim phrase “to include any limit set forth in a USB specification, including limits related to voltage.” Dec. on Inst. 10. We reasoned that, in contrast to the language of claim 1, claim 10 does not expressly require that the USB specification imposed limit be “associated” with the supply of current on the VBUS line. *Id.* at 9.

The parties disagree with our preliminary construction of claim 10. Petitioner contends the plain and ordinary meaning of claim 10 requires an adapter configured to supply current on the VBUS line without regard to a USB imposed limit that would either limit or prevent the supply of current on the VBUS line.⁸ Tr. 7:24–9:11. And although claim 10 does not

claim differentiation argument with respect to independent claim 10 and dependent claim 11. See Sur-Reply 9.

⁸ Petitioner asserts “the Board correctly interpreted claim 10” in the institution decision because “the Board concluded” that “a voltage limit is a ‘USB Specification imposed limit’ that affects the supply of current.” Pet. Reply 4 (citing Dec. on Inst. 9–10). We never concluded, however, that a voltage limit affects the supply of current. Dec. on Inst. 9–10. Instead, we determined that claim 10 was broad enough to encompass “any limit set

expressly state that the imposed limit is “associated” with supplying current on the VBUS line, as is expressly required in claim 1, Petitioner contends claims 1 and 10 simply represent “two different ways of saying the same thing.” Tr. 10:4–11.

Patent Owner agrees with Petitioner that the imposed limit of claim 10 must be related to supplying current on the VBUS line, but for the reasons discussed above with respect to claim 1, disagrees that a voltage limit affects the supply of current on the VBUS line in the USB specification.

PO Resp. 16–17; Sur-Reply 8–9 (citing Ex. 2011 ¶¶ 49, 55).

Here, the parties agree that the USB specification imposed limit recited in claim 10 is a limit that affects or limits the supply of current on the VBUS line. Pet. Reply 4; Sur-Reply 8; Tr. 8:22–9:3, 10:4–11. Given the parties’ agreement, and the general association between supplying current on the VBUS line and the “at least one USB Specification imposed limit” in claim 10, we cannot conclude that our initial construction encompassing *any* USB imposed limit, regardless of whether it was associated with or related to providing current on the VBUS line, was reasonable. Accordingly, we construe claim 10 to encompass only those USB specification imposed limits that affect or limit the supply of current on the VBUS line.

For the reasons discussed above with respect to claim 1, Petitioner has not persuasively demonstrated that the voltage limit set forth in the USB specification affects or serves to limit the current on the VBUS line. Thus, we are not persuaded that claim 10 encompasses providing current on the

forth in a USB specification,” a construction Petitioner now rejects. See Dec. on Inst. 9–10; Tr. 7:24–10:11.

VBUS line without regard to a USB specification imposed limit on voltage, as asserted by Petitioner.

B. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103(a) 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 said subject matter pertains. *See 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) if in the record, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

C. Level of Ordinary Skill in the Art

Relying on the testimony of Mr. Geier, Petitioner contends one of ordinary skill in the art would have had “a master’s degree in electrical engineering, computer science, or a related field, plus 2-3 years of experience with [USB].” Pet. 5 (citing Ex. 1009 ¶¶ 3–6, 23).

Patent Owner contends a person of ordinary skill in the art would have had a bachelor’s degree in electrical engineering and 3–5 years of experience in circuit or device design, or equivalents thereof. PO Resp. 11 (citing Ex. 2011 ¶¶ 44–45). In support of this argument, Dr. Fernald testifies that a person of ordinary skill in the art would not have required an advanced degree or 2–3 years of experience with USB, as asserted by Petitioner,

because projects in the field were typically assigned to generally trained engineers with bachelor's degrees. Ex. 2011 ¶¶ 44–45.

Petitioner and Mr. Geier provide no reasoned justification for their identification of one of ordinary skill in the art. Pet. 5 (relying on Mr. Geier's testimony to support its identification of one of ordinary skill in the art); Ex. 1009 ¶ 23 (“For purposes of this declaration, I have been asked to apply the following standards for a person of ordinary skill in the art . . .”). Conversely, Dr. Fernald persuasively explains why one of ordinary skill in the art would have had a bachelor's degree in electrical engineering and 3–5 years of experience in circuit or device design, and why one of ordinary skill in the art would not have required an advanced degree or multiple years of experience with USB. PO Resp. 11–12; Ex. 2011 ¶¶ 44–46. Thus, we adopt Patent Owner's definition of one of ordinary skill in the art for purposes of this Decision.

D. Obviousness of Claims 1–3, 9–12, and 18 over Rogers

Petitioner contends the subject matter of claims 1–3, 9–12, and 18 would have been obvious in view of Rogers. Pet. 16–36.

1. Rogers

Rogers discloses a Local Area Network (LAN) phone that, “unlike most other telephones, is capable of supporting a variety of accessories.” Ex. 1005, 10:56–57. Rogers provides this expanded accessory support by utilizing USB to both power and communicate with attached accessories. *Id.* at 10:59–11:19.

Rogers notes that one difficulty with using a USB interface to power an accessory is that the USB interface is limited to 5 volts (or 5 VDC) and 0.5 amps of current. *Id.* at 10:67–11:3. “This means that the maximum

power available is 2.5 Watts, with 0.5 Watt for each device,” which Rogers explains is “too little for many potential devices.” *Id.* at 11:4–8.

As examples of the insufficient power provided over USB, Rogers notes that an accessory console might have 100 LEDs that each draw 20 mA of current, and “a speaker phone unit could easily exceed the 2.5 Watt maximum” of USB. *Id.* at 11:8–14.

To overcome the power limitations of existing USB systems, Rogers discloses “a unique dual voltage accessory power system” that allows the LAN telephone to alternatively supply power at 5 VDC or 48 VDC, thereby increasing available power “by a factor of 10.” *Id.* at 11:14–19.

Figures 7(a) and 7(b) of Rogers are reproduced below:

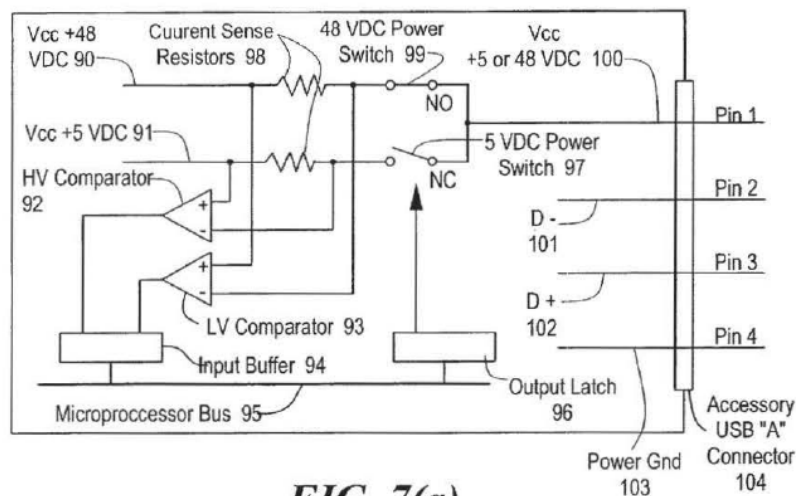


FIG. 7(a)

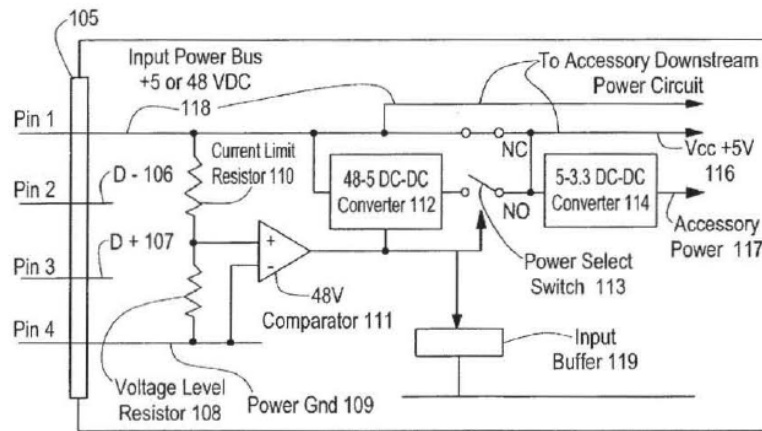


FIG. 7(b)

Figure 7(a) shows a source power system and Figure 7(b) depicts an illustrative accessory internal power system. *Id.* at 11:20–25. As shown in Figure 7(a), source power is provided via accessory connector 104 of the source power system, which may be a USB “A” connector. *Id.* at 11:28–31. Power pin 1 and ground pin 4 of accessory connector 104 are used to provide power to the accessory and pins 2 (D-) and 3 (D+) are used for data transfers. *Id.* at 11:31–34, Figs. 7(a), 7(b). Accessory connector 105 of the accessory (Figure 7(b)) is a standard USB “B” connector having connection points for pins 1, 2, 3, and 4 of connector 104. *Id.* at 12:14–17, Fig. 7(b).

During operation of the source power system shown in Fig. 7(a), the “default power setting is normally 5 VDC.” *Id.* at 11:44–45. “When an accessory is connected, the accessory is queried by the base unit microprocessor” via the USB interface to determine whether the accessory uses 5 VDC or 48 VDC. *Id.* at 11:45–48. “Such a query may, for example, be provided to the accessory over the data lines of the modified USB interface.” *Id.* at 11:48–50. If the response to this query is in the affirmative, the base unit microprocessor switches the voltage to 48 VDC. *Id.* at 11:50–54. When 48 VDC is available from the base unit, the

accessory microprocessor “can enable functions that require higher power.”
Id. at 12:36–40.

A “downstream power circuit” is provided within the accessory power system and may provide either 5 VDC or 48 VDC, depending on whether 48 VDC is available, to another accessory “daisy-chained” to the first accessory. *Id.* at 12:40–45.

2. Analysis—Independent Claim 1

Petitioner identifies Rogers’ LAN telephone base unit as the claimed “adapter,” and demonstrates that this adapter has a USB VBUS line and a USB communication path. Pet. 22–25 (citing Ex. 1005, Fig. 7(a) (disclosing four pins of the USB “A” connector), 11:28–34). Patent Owner does not dispute that Rogers discloses these limitations.

The parties’ dispute centers around whether Rogers discloses an adapter configured to supply current on the VBUS line without regard to at least one associated condition specified in a USB specification. Petitioner contends this limitation is disclosed in Rogers because Rogers’ system allegedly (1) provides 48 VDC on the VBUS line, (2) provides greater than 500 mA of current on the VBUS line, and (3) provides greater than 100 mA of current on the VBUS line without performing USB enumeration. We discuss these arguments below.

a. Increased Voltage

The adapter of Rogers is configured to supply 48 VDC to an accessory, which is more than nine times the 5.25 V limit set forth in the USB specification. Pet. 27; Ex. 1008, 178. Petitioner therefore contends that Rogers’ adapter is configured to supply current on the VBUS line

without regard to at least one associated condition specified in a USB specification, as recited in claim 1. Pet. 27.

Petitioner's argument is not persuasive because it is premised on a claim construction we do not adopt. In particular, for the reasons discussed in Section II.A above, we are not persuaded that the 5.25 V limit of the USB specification is an "associated condition" specified in the USB specification regarding the supply of current on the VBUS line.

b. Increased Current

Petitioner contends Rogers' base unit is configured to supply current on the VBUS line without regard to the 500 mA and 100 mA⁹ current limits set forth in the USB specification. Pet. 28–29. Although Rogers does not expressly state that the disclosed system violates the 500 mA limit of the USB specification, Petitioner contends one of ordinary skill in the art would have understood that Rogers must exceed this limit in order to meet the power demands of the attached accessories. *Id.* at 29 (asserting that the 100 LEDs of Rogers' console would draw more than 2A of current (citing Ex. 1009 ¶ 66)).

Rogers discloses a "dual-voltage" accessory power system that "allows the LAN telephone to alternately supply power at 48 VDC, instead of 5 VDC, thus increasing the power consumption by a factor of 10." Ex. 1005, 11:16–19. Dr. Fernald persuasively explains that, because $\text{Power} = \text{Current} \times \text{Voltage}$, one of ordinary skill in the art would have

⁹ The USB specification limits the power USB devices can consume from VBUS to one unit load (100 mA) or less until configured. Pet. 28 (citing Ex. 1008, 245). We analyze below (Section II.D.2.c) whether Rogers' system provides current on the VBUS line without performing enumeration.

understood that it is the increase in voltage, and not current, that results in power increasing by a factor of 10 in Rogers. Ex. 2011 ¶ 63. Moreover, although the LEDs of Rogers' console could require up to 2A of current to operate, Dr. Fernald persuasively explains that this current is generated *within* the accessory of Rogers, and is not provided across the VBUS line of the adapter. *Id.* ¶¶ 68–74 (explaining that the “48-5 DC-DC Converter” and “5-3.3 DC Converter” within the accessory power system of Rogers would provide the current necessary to drive the functions of the accessories). Petitioner provides no persuasive evidence or argument to counter Dr. Fernald's factually-supported testimony. Thus, we are not persuaded that Rogers expressly discloses an adapter configured to provide greater than 500 mA of current on the VBUS line.

In reply, Petitioner asserts Patent Owner and Dr. Fernald have mistakenly assumed that the console of Rogers operates only in 48 VDC mode, and contends that when the console is in the 5 VDC mode the base unit must provide 1.73A of current over the VBUS line just to drive the console's LEDs. Pet. Reply 11–12 (citing PO Resp. 27 (providing annotated version of Figure 7(b) of Rogers)). Thus, Petitioner contends Rogers “teaches, *or at least suggests*, supplying current on VBUS without regard for the USB current limits.” *Id.* at 11.

Rogers discloses operating the attached accessories in either a “low-power” or “high-power” mode. Ex. 1005, 11:16–19 (noting that power can be supplied at either 5 VDC or 48 VDC), 12:12–14 (“The system of Fig. 7(b) allows the accessory to automatically switch from low-power to high-power modes.”); Ex. 1015, 29:13–16 (Dr. Fernald testifying on cross-examination that the voltage on VBUS between Figure 7(a) and 7(b) is

either 5 VDC or 48 VDC). Rogers further discloses that “[i]f 48 VDC is present, then the accessory microprocessor 124 can enable functions that require higher power.” Ex. 1005, 12:38–42. Contrary to Petitioner’s assertions, there is no persuasive evidence to suggest that the high-power functions of Rogers’ accessories are enabled when only 5 VDC is available from the adapter. *See* Ex. 1005, 11:14–16, 12:12–14, 12:38–40; Ex. 2011 ¶ 75 (Dr. Fernald testifying that one of ordinary skill in the art would not have understood Rogers to “contemplate high-power functions being enabled as a result of increased current supply”). Thus, we are not persuaded that Rogers “suggests” exceeding the 500 mA limit set forth in the USB specification in order to power Rogers’ accessories in the 5 VDC mode.

Petitioner also argues that because Rogers “expressly teaches that multiple accessories may be ‘daisy-chained’” together, one of ordinary skill in the art would have understood that the VBUS line would need to carry more than 500 mA of current to power all of these devices. Pet. Reply 12. Dr. Fernald persuasively explains, however, that a USB-powered accessory providing power to downstream accessories is a “bus-powered USB hub,” which pursuant to the USB specification is only permitted to draw up to 500 mA of current even after configuration, which necessarily limits the maximum current the hub may provide to downstream devices to 500 mA. Ex. 2011 ¶ 80; PO Resp. 31–32. Accordingly, we are not persuaded that Rogers’ disclosure of a “daisy-chained” accessory teaches or suggests violating the 500 mA limit of the USB specification.

Petitioner also asserts that one of ordinary skill in the art would have found it “obvious to try” providing increased current over the VBUS line.

Pet. Reply 9–10. Petitioner reasons that Rogers broadly discloses “departing from the USB specification’s strict limits to provide higher power,” and contends this would have suggested to “one of ordinary skill in the art that they *could* supply current without regarding to the USB current limits.” *Id.*

The Petition does not set forth an “obvious to try” theory, but instead asserts that Rogers “is configured to supply current” on the VBUS line without regard to the 500 mA and 100 mA current limits specified in the USB specification. Pet. 29. It would be unfair to Patent Owner to allow Petitioner to now switch mid-stream to an “obvious to try” rationale. See *Wasica Fin. GmbH v. Continental Auto. Sys., Inc.*, 853 F.3d 1272, 1286–87 (Fed. Cir. 2017); *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (“Unlike district court litigation—where parties have greater freedom to revise and develop their arguments over time and in response to newly discovered material—the expedited nature of IPRs bring with it an obligation for petitioners to make their case in the petition to institute.”). Accordingly, we decline to consider this new argument.

Even if we considered Petitioner’s late-arising argument, however, we would not find it persuasive. An “obvious to try” rationale for obviousness requires evidence that the ordinarily skilled artisan would have had a reason to select the route that produced the claimed invention, that the options the skilled artisans would encounter were “finite,” “small,” or “easily traversed,” and that the ordinarily skilled artisan would have anticipated success. *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1072–73 (Fed. Cir. 2012); see also *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007); *Leo Pharm Prods., Ltd v. Rea*, 726 F.3d 1346, 1356–57 (Fed. Cir. 2013) (noting that an obvious to try

theory requires a known problem, with a finite number of approaches for solving the problem, and a predictable solution). Here, Petitioner does not adequately explain why one of ordinary skill in the art would have tried to exceed the current limits identified in the USB specification in Rogers when sufficient power is already provided in that system using 48 VDC. Nor does Petitioner present evidence to establish that the number of potential solutions for providing increased power over Rogers' USB interface were finite, small, or easily traversed, or that one of ordinary skill in the art would have had a reasonable expectation of success in providing more than 500 mA of current over the VBUS line of Rogers. See Pet. Reply 10 (concluding without analysis that the '550 patent is "in a predictable field with a finite number of solutions"); Sur-Reply 13–15 (identifying the deficiencies in Petitioner's "obvious to try" theory). Thus, Petitioner's "obvious to try" rationale is not persuasive.

In view of the foregoing, we are not persuaded that Rogers teaches or suggests violating the 500 mA current limit set forth in the USB specification.

c. Enumeration

Rogers discloses the following procedure when an accessory is connected to the telephone base unit:

When an accessory is connected, the accessory is queried by the base unit microprocessor 74, via the USB interface 55, to determine if the accessory uses 48 VDC. Such a query may, for example, be provided to the accessory over the data lines of the modified USB interface. A 48 VDC-capable accessory will respond to such a query in the affirmative. If the microprocessor 74 determines that the accessory uses 48 VDC, then the microprocessor 74 switches the voltage to 48 VDC.

Ex. 1005, 11:45–54.

Petitioner contends Rogers does not expressly disclose performing USB enumeration, and the query and affirmative response procedure set forth above does not constitute bus enumeration as set forth in the USB specification. Pet. 31. According to Petitioner, “[t]his establishes that the base unit 6 (i.e., *said adapter*)” of Rogers is configured to supply current on the VBUS line without regard to the bus enumeration conditions specified in the USB specification. *Id.* We are not persuaded by this argument.

Rogers’ system uses USB to communicate with attached accessories. Ex. 1005, 10:60–62 (“In order to facilitate the expansion selection, the LAN telephone uses the Universal Serial Bus (USB) to communicate with the accessories.”). Dr. Fernald testifies that Rogers’ system must perform enumeration in order to communicate with, and utilize the functions of, accessories connected using USB. Ex. 2011 ¶¶ 32, 87–91 (“[B]ecause configuration is required for functional USB communication, a POSA would understand that configuration would be required before the LEDs began consuming power in Rogers’ operator console.”). Dr. Fernald’s testimony is well-supported by the evidence of record. Ex. 1008, 243 (“When a USB device is attached to or removed from the USB, the host uses a process known as bus enumeration to identify and manage the device state changes necessary.”), 244 (“A USB device must be configured before its function(s) may be used.”); Ex. 1009 ¶ 37; Ex. 2013, 233:15–20 (Mr. Geier conceding that a USB-compliant device must undergo enumeration before its functions may be accessed).

In reply, Petitioner does not contest that enumeration is required for USB-compliant devices to communicate, but contends that because the 48 V

query of Rogers is not specified in the USB specification, the use of this non-compliant query would have “at least suggested to one of ordinary skill in the art that current could be supplied on VBUS” without enumeration. Pet. Reply 14. Petitioner does not explain, however, how the system of Rogers could forgo USB enumeration and still communicate with downstream devices over the USB interface and access their functions. Ex. 1008, 243 (assigning the USB device a unique address during the enumeration process), 244 (“A USB device must be configured before its function(s) may be used.”). Thus, it is not evident why Rogers’ use of a non-compliant query would have suggested to one of ordinary skill in the art that they could forgo USB enumeration in Rogers, or why one of ordinary skill in the art would have had a reasonable expectation of success in so doing. *See Proctor & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994–95 (Fed. Cir. 2009) (explaining that one of ordinary skill in the art, at the time of the invention, must have had a reasonable expectation of success in combining the teachings of the prior art references to arrive at the claimed invention).

Petitioner also asserts that “[i]n a predictable field with a finite number of solutions, it certainly would have been obvious to try” supplying current on the VBUS line without enumeration. Pet. Reply 14. Petitioner did not make an “obvious to try” argument in the Petition. Pet. 31 (asserting that base unit 6 of Rogers “is configured to supply current” on the VBUS line “without regard to the bus enumeration conditions specified in the USB 2.0 specification”). Thus, we decline to consider this new argument.

Even if we were to consider Petitioner’s new “obvious to try” rationale, however, we would not find it persuasive as Petitioner presents

insufficient evidence that Rogers and the '550 patent are in “a predictable field,” that there were a finite number of solutions for communicating over the USB of Rogers, or that one of ordinary skill in the art would have had a reasonable expectation of success in communicating in Rogers without performing enumeration. *See* Pet. Reply 14.

In view of the foregoing, we are not persuaded that Rogers teaches or suggests providing current over the VBUS line without enumeration.

d. Conclusion with Respect to Claim 1

For the reasons set forth above, Petitioner has not sufficiently demonstrated that Rogers teaches or suggests “an adapter configured to supply current on the VBUS line without regard to at least one associated condition specified in a USB specification,” as recited in claim 1. Thus, Petitioner has not demonstrated by a preponderance of the evidence that claim 1 would have been obvious over Rogers.

3. Analysis—Independent Claim 10

Claim 10 differs from claim 1 in that it requires an adapter “configured to supply current on the VBUS line without regard to at least one USB Specification imposed limit.” Ex. 1001, 12:34–36. Petitioner contends the subject matter of claim 10 would have been obvious over Rogers. Pet. 34. In support of this argument, Petitioner repeats its arguments discussed above for claim 1. *Id.* In particular, Petitioner contends the adapter of Rogers is configured to supply current on the VBUS line without regard to (1) the 5.25 V limit set forth in the USB specification; (2) the 500 mA and 100 mA current limits set forth in the USB specification; and (3) the bus enumeration limit set forth in the USB specification. *Id.*

Patent Owner contends claim 10 would not have been obvious over Rogers because (1) the USB specification's voltage limit is not a limit regarding the supply of current on the VBUS line; (2) Rogers does not disclose violating the 500 mA current limit; and (3) Rogers does not disclose providing greater than 100 mA of current on the VBUS line without enumeration. PO Resp. 12–17, 20–22, 39.

For the reasons discussed above (Section II.A), Petitioner has not demonstrated that a voltage limit serves to limit or affect the supply of current on the VBUS line. Petitioner also has not demonstrated that Rogers discloses exceeding the 500 mA and 100 mA current limits set forth in the USB specification, or providing greater than 100 mA of current on the VBUS line without enumeration (*see* Section II.D.2). Accordingly, Petitioner has not shown by a preponderance of the evidence that the subject matter of claim 10 would have been obvious in view of Rogers.

4. Analysis—Dependent Claims 2, 3, 9, 11, 12, and 18

Claims 2, 3, and 9 depend, directly or indirectly, from independent claim 1, and claims 11, 12, and 18 depend, directly or indirectly, from independent claim 10. Claims 2 and 11 require exceeding a current limit set forth in a USB specification, claims 3 and 12 require supplying current without USB enumeration, and claims 9 and 18 require that the current limit is 500 mA. Petitioner does not provide arguments or supporting evidence with respect to these claims that would remedy the defects noted above for independent claims 1 and 10. Moreover, for the reasons set forth above (Section II.D.2), Petitioner has not demonstrated that Rogers teaches or suggests an adapter configured to exceed a current limit set forth in the USB specification or an adapter configured to provide greater than 100 mA of

current on the VBUS line without USB enumeration. Thus, Petitioner has not shown by a preponderance of the evidence that the subject matter of claims 2, 3, 9, 11, 12, and 18 would have been obvious over Rogers.

E. Obviousness of Claims 4–8 and 13–17 over Rogers and Shiga

Petitioner contends the subject matter of dependent claims 4–8 and 13–17 would have been obvious over the combined disclosures of Rogers and Shiga.¹⁰ Pet. 36–54.

1. Shiga

Shiga discloses a USB-connected keyboard that allows a host computer to be started by pressing a power-on key on the keyboard. Ex. 1006, 2:4–8, Abstract. To accomplish this task, Shiga provides a signal to a “wake-up means” in the computer when the power-on key is pressed. *Id.* at 3:1–7

Table 1 of Shiga is reproduced below:

TABLE 1			
	Low Speed	Full Speed	Unconnected
D+	L (Hi-Z)	H	L (Hi-Z)
D-	H (Hi-Z)	L (Hi-Z)	L (Hi-Z)

Table 1 of Shiga shows the standard line states of the USB specification. *Id.* at 5:46–47, Table 1. Shiga explains that there are three standard signal line states identified in the USB specification. *Id.* at 5:46–54. In the low speed state, signal line D+ is in an L (Hi-Z or high impedance) state and D- is in an H (high level) state. *Id.* at 5:55–57. In the high speed state, signal

¹⁰ Petitioner’s arguments with respect to dependent claims 4–8 and 13–17 do not remedy the deficiencies discussed above with respect to independent claims 1 and 10. To ensure a complete record, however, we proceed to analyze Petitioner’s arguments with respect to the Rogers and Shiga ground.

line D+ is in the H state and signal line D- is in the L state. *Id.* at 5:58–59. In the unconnected state, both D- and D+ signal lines are in the L state. *Id.* at 5:59–60. In addition to these standard signal line states, Shiga discloses that the signal lines may also be placed into a fourth, non-standard state, wherein both the D+ and D- signal lines are in the H state. *Id.* at 5:60–62, 6:48–58.

Shiga provides a non-standard, or “fourth mode,” signal to a “wake-up means” in response to a user pressing the keyboard’s power-on key. *Id.* at 3:1–3, 4:33–53, 6:59–65. Shiga explains that, because this line state is not a standard USB state and is provided as a 50 ms pulse at 3 volts, it is “easily distinguished from USB standard data signals.” *Id.* at 6:48–58.

2. Analysis

Claims 4 and 13 depend from independent claims 1 and 10, respectively, and require that “current is supplied in response to an abnormal data condition on said USB communication path.” Ex. 1001, 12:17–19, 12:41–43. Petitioner concedes that Rogers does not disclose providing current in response to an abnormal data condition on the USB communication path, but contends one of ordinary skill in the art would have found it obvious to use Shiga’s abnormal “fourth mode,” or SE1¹¹ condition, in Rogers’ system to signal that the accessory is capable of handling 48 VDC. Pet. 41.

¹¹ SE1 is “a state in which both the D+ and D- lines are at a voltage above VOSE1 (min), which is 0.8 V.” Pet. 11 (citing Ex. 1009 ¶ 40). The parties agree that the “fourth mode” signal of Shiga is an SE1 signal. *Id.*; Ex. 2011 ¶ 38.

Petitioner asserts one of ordinary skill in the art would have sought to implement SE1 signaling in Rogers because Shiga and Rogers are in the same field of endeavor, Rogers leaves the implementation specifics for providing the affirmative response from the accessory to the telephone to one of ordinary skill in the art, and one of ordinary skill in the art would have understood that Shiga's SE1 signals are suitable for use in Rogers' system, as they are "easily distinguished from USB standard data signals" and would not interfere with standard USB signaling. *Id.* at 5–14, 40–45.

Patent Owner contends that, to the extent that one of ordinary skill in the art would have looked at methods beyond USB enumeration to signal that Rogers' accessory is capable of handling 48 VDC, such an ordinarily skilled artisan would not have looked to use SE1 signaling for this purpose. PO Resp. 48–56. In support of this argument, Patent Owner and Dr. Fernald present evidence that SE1 signaling is prohibited in the USB specification, would provide no advantage over using USB enumeration to communicate voltage capabilities, would shut down the USB port and prevent continued communications between the host and an attached accessory, could lead to inadvertently providing excess power to attached accessories, and could lead to an inability to identify and resolve errors within Rogers' system. *Id.* at 51–62; Ex. 2011 ¶¶ 35–37, 94, 104–106, 108, 109, 115–117, 124–126; Ex. 1008, 123, 316 (explaining that an SE1 condition on the bus will cause a "reset condition" on the bus, and failure to place the port in the disconnect state before the device resets "can cause system errors that are very difficult to isolate and correct").

In its Reply, Petitioner does not dispute that Shiga's SE1 signal would disable Rogers' USB port and interfere with ongoing USB communications,

but contends one of ordinary skill in the art “could easily have designed the system to react differently to the SE1 signal (i.e., recognize the device as 48V-compliant, rather than disabling the port).” Pet. Reply 15–16.

Petitioner provides no persuasive evidence to support its proposed sweeping change to the USB protocol, much less an explanation of how this new USB communication protocol would work in Rogers. *See Elbit Sys. of Am., LLC v. Thales Visionix, Inc.*, 881 F.3d 1354, 1359 (Fed. Cir. 2018) (explaining that attorney argument is not evidence) (citing *Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1043 (Fed. Cir. 2017)). Moreover, Dr. Fernald persuasively testifies that modifying Rogers to recognize Shiga’s SE1 signal as reflective of the connection of a 48 VDC-capable device, and not to indicate an error condition on the bus, would lead to a situation where errors normally identified by an SE1 condition could not be isolated and corrected within the system. Ex. 2011 ¶ 117. Petitioner does not contest Dr. Fernald’s testimony or explain how the modified system of Rogers would be able to handle subsequent SE1 error signals.

Given the significant drawbacks to using an SE1 signal in Rogers, and given the lack of credible evidence or argument to explain how these drawbacks could be avoided, we are not persuaded that one of ordinary skill in the art would have sought to implement Shiga’s SE1 signal in Rogers. Ex. 2011 ¶¶ 116–117, 124 (Dr. Fernald testifying that one of ordinary skill in the art “would not have designed a system that would render the system incompatible with the very components (48 VDC accessory) for which it is designed”). Thus, Petitioner has not demonstrated by a preponderance of the evidence that the subject matter of claims 4 and 13 would have been obvious over the proposed combination of Rogers and Shiga.

Claims 5–8 and 14–17 depend, directly or indirectly, from either claim 4 or 13. Petitioner’s arguments with respect to these claims do not remedy the deficiencies noted above for claims 4 and 13. Accordingly, Petitioner has not demonstrated by a preponderance of the evidence that the subject matter of dependent claims 5–8 and 14–17 would have been obvious over the combined disclosures of Rogers and Shiga.

IV. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has not demonstrated by a preponderance of the evidence that challenged claims 1–3, 9–12, and 18 would have been obvious over Rogers, or that claims 4–8 and 13–17 would have been obvious over Rogers and Shiga.

V. ORDER

It is hereby

ORDERED that claims 1–18 of the ’550 patent have not been shown to be unpatentable; 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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