

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

KAIJET TECHNOLOGY INTERNATIONAL LIMITED, INC.,
Petitioner,

v.

SANHO CORPORATION,
Patent Owner.

IPR2021-00886
Patent 10,572,429 B2

Before KEN B. BARRETT, JONI Y. CHANG, and
DANIEL J. GALLIGAN, *Administrative Patent Judges*.

CHANG, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

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I. INTRODUCTION

Kaijet Technology International Limited, Inc. (“Petitioner”) filed a Petition (Paper 2) and a Corrected Petition (Paper 15, “Petition” or “Pet.”) requesting an *inter partes* review (“IPR”) of claims 1–6 and 13–17 (“the challenged claims”) of U.S. Patent 10,572,429 B2 (Ex. 1001, “the ’429 patent”). Pet. 1; Paper 14 (Decision granting Motion to Correct Petition). Sanho Corporation (“Patent Owner” or “Sanho”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). On November 1, 2021, we instituted this IPR as to all of the challenged claims. Paper 16 (“Dec.”). After institution, Patent Owner filed redacted and un-redacted versions of a Response (Papers 22 and 23, “PO Resp.”), along with a Motion to Seal certain exhibits and certain portions of the Response that reference those exhibits (Paper 24). Petitioner filed redacted and un-redacted versions of a Reply (Papers 40 and 41, “Reply”), along with a Motion to Seal certain portions of the Reply (Paper 42). Patent Owner also filed a Sur-reply (Paper 43, “Sur-reply”). An oral hearing was held on July 25, 2022, and a transcript has been entered into the record as Paper 52 (“Tr.”). For the reasons that follow, Petitioner has demonstrated by a preponderance of the evidence that claims 1–6 and 13–17 of the ’429 patent are unpatentable.

A. Related Matter

The ’429 patent is involved in *Sanho Corporation v. Kaijet Technology International Limited, Inc. d/b/a j5create*, No. 1-20-cv-02150 (N.D. Ga. May 19, 2020). Pet. 2; Paper 7, 2.

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B. The '429 Patent

The '429 patent discloses a port extension apparatus. Ex. 1001, code (57). Figure 2 of the '429 patent is reproduced below.

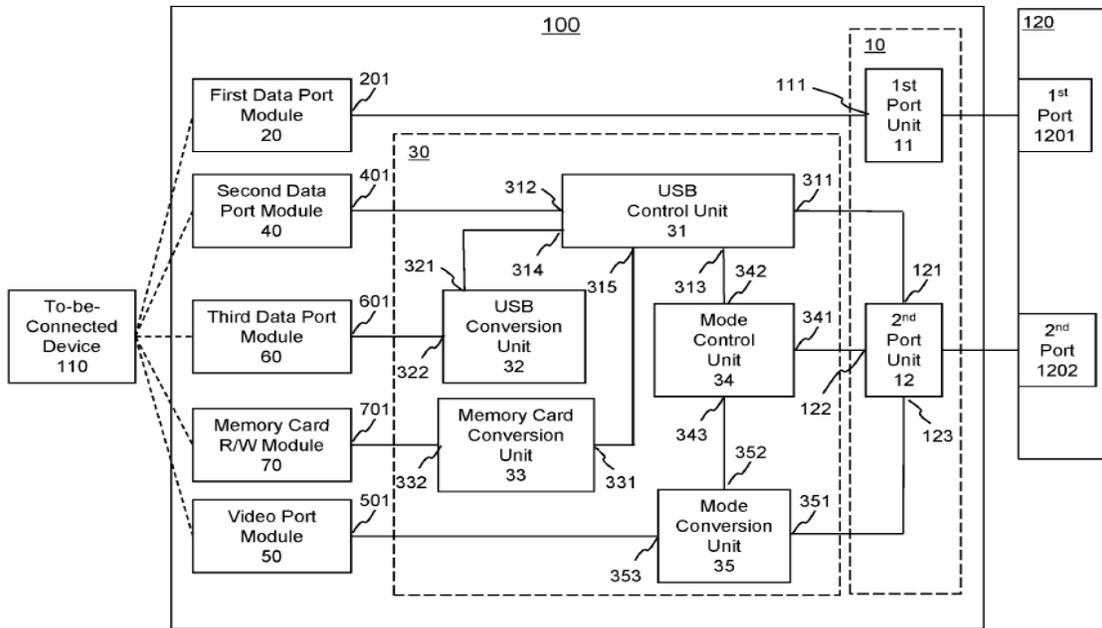


Figure 2 above is a functional diagram of a port extension apparatus. *Id.* at 2:32–34. Port extension apparatus 100 includes main port module 10 for connecting to ports of end-user device 120, first data port module 20, data transmission control module (“DTCM”) 30, second data port module 40, video port module 50, third data port module 60, and memory card module 70. *Id.* at 3:5–10. Main port module 10 includes first port unit 11 and second port unit 12. *Id.* at 4:5–6. DTCM 30 includes Universal Serial Bus (“USB”) control unit 31, USB conversion unit 32, memory card conversion unit 33, mode control unit 34, and mode conversion unit 35. *Id.* at 4:16–19. First data transmission port (“DTP”) of DTCM 30 comprises data ports 311,

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341, 351, connecting to main port module 10; second DTP of DTCM 30 comprises data ports 312, connecting to second data port module 40; third DTP of DTCM 30 comprises data port 353, connecting to video port module 50; fourth DTP of DTCM 30 comprises data 322, connecting to third data port module 60; and data read/write port of DTCM 30 comprises DTP 332, connecting to memory card module 70. *Id.* at 3:5–4:46.

C. Illustrative Claim

Claim 1 is independent. Claims 2–6 and 13–17 depend ultimately from claim 1. Claim 1 is illustrative:

1. A port extension apparatus for extending ports of an end-user device comprising:

[1.1] a main port module for connecting to an end-user device, the main port module having first and second port units;

[1.2] a first data port module operatively connecting to the first port unit;

[1.4] a data transmission control module operatively connecting to the second port unit via a first data transmission port of the data transmission control module;

[1.5] a second data port module operatively connecting to a second data transmission port of the data transmission control module; and

[1.7] a video port module operatively connecting to a third data transmission port of the data transmission control module; wherein

[1.3] when a to-be-connected device connects to the first data port module, the first data port module and the main port module

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form a transmission path enabling data transmission between the to-be-connected device and the end-user device;

[1.6] when a to-be-connected device connects to the second data port module, the data transmission control module controls data transmission between the to-be-connected device and the end-user device; and

[1.8] when a to-be-connected device connects to the video port module, the data transmission control module receives the to-be-displayed information from the end-user device to the to-be-connected device to display.

Ex. 1001, 6:46–7:6 (reference numbers assigned by Petitioner added in brackets).

D. Prior Art Relied Upon

Petitioner relies upon the references listed below (Pet. 4):

Reference	Date	Exhibit No.
Kwon, U.S. Patent No. 8,649,169 B2	Feb. 11, 2014	1005
Kuo, U.S. Application Publication No. 2018/0165053 A1	June 14, 2018	1006
O’Shea, U.S. Patent No. 7,503,808 B1	Mar. 17, 2009	1007
Chang, U.S. Patent Application Publication No. 2012/0003852 A1	Jan. 5, 2012	1008

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E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability (Pet. 4):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–6, 13–17	103 ¹	Kwon, Kuo
1–6, 13–17	103	Kwon, Kuo, Chang
1–6, 13–17	103	O’Shea, Kuo
1–6, 13–17	103	O’Shea, Kuo, Chang

II. ANALYSIS

A. Claim Construction

In an IPR, we construe a claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b).” 37 C.F.R. § 42.100(b) (2020). Under this standard, the words of a claim are generally given their “ordinary and customary meaning,” which is the meaning the term would have to a pertinent artisan at the time of the invention, in the context of the entire patent. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). In light of the parties’ arguments, we find that it is necessary to construe only the claim terms identified below. *See Realtime Data LLC v. Iancu*, 912 F.3d 1368,

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Because the ’429 patent was filed after this date, we refer to the AIA versions of §§ 102 and 103. Ex. 1001, code (22).

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

1. “main port module . . . having first and second port units”

Element 1.1 recites “a main port module for connecting to an end-user device, the main port module having first and second port units.”

a. District Court’s claim construction

Both parties agree with the District Court’s construction in the related litigation, construing element 1.1 as “a component interacting with a larger system and having a defined boundary distinct from other modules in the system, wherein the component contains a first and second port unit for directly connecting to an end-user device.” PO Resp. 6; Reply 1–2. We agree with that construction as it is consistent with the Specification and the prosecution history. Notably, the Specification discloses that “main port module 10 includes a first port unit 11 and a second port unit 12.” Ex. 1001, 4:5–6, Fig. 2. The Specification also discloses that a main port module is a separate component having a defined boundary distinct from other modules. *Id.* at 3:5–6:32, Figs. 1, 2. During the prosecution of the ’429 patent, Applicant differentiated claim 1 from the prior art, asserting that the claimed “first and second port units are contained in the main port module.” Ex. 1002, 66–67.

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b. Main port module contains first and second port units

Both parties agree that the port units may be contained partially within the main port module. Reply 11; Tr. 43:22–44:5. Patent Owner admits that a relevant artisan would have understood “that the male connectors are examples of data port units.” Tr. 49:11–13. The Specification makes clear that port units 11, 12 may be male ports. Ex. 1001, 5:24–35. Thus, we clarify that the port units are not required to be contained completely within the main port module.

c. Patent Owner’s “material component” proposed construction

Patent Owner for the first time during oral argument raised a new construction, suggesting that “if a *material component* of what the data port unit is *located inside the housing of the main port module*, then that would suffice to meet the limitation.” Tr. 44:2–5 (emphases added).

However, new argument may not be presented at the oral hearing. *See Dell Inc. v. Acceleron, LLC*, 884 F.3d 1364, 1369 (Fed. Cir. 2018) (holding that the Board is obligated under its own regulations to dismiss untimely argument “raised for the first time during oral argument”). Further, even if we were to consider Patent Owner’s new argument, we would decline to adopt that construction because it would improperly import an extraneous limitation into the claims, without support in the Specification or prosecution history. *E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1433 (Fed. Cir. 1988) (holding that reading an “extraneous limitation” into a claim is improper). Patent Owner also does not explain what

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“material component” means. Therefore, we decline to adopt Patent Owner’s construction that requires a material component of the port unit to be located inside the main port module.

d. Patent Owner’s implicit claim construction

Through its arguments regarding objective evidence of non-obviousness, Patent Owner implies that connectors attaching to the substrate of the overall port extension system show a main port module. PO Resp. 50–51 (arguing that “the Hyperdrive features a main port module . . . having first and second port units because Hyperdrive has a substrate . . . which supports miniature electronic components”). Essentially, Patent Owner’s implicit construction attempts to eliminate the claim limitation of a main port module. We decline to adopt Patent Owner’s implicit construction, as it is inconsistent with the Specification and prosecution history. A main port module in the context of the ’429 patent is a separate component having a defined and distinct boundary, not merely port units attached to the substrate of the overall system.

The Specification consistently describes the main port module as a separate component, having a defined boundary distinct from other modules and the boundary of the overall system. Ex. 1001, 3:5–6:32, Figs. 1, 2. Notably, Figure 2 shows main port module 10 as a separate component having a defined boundary distinct from other modules and overall port extension system 100, not merely two port units on the substrate of the overall system. *Id.* The Specification further describes that “[i]n all

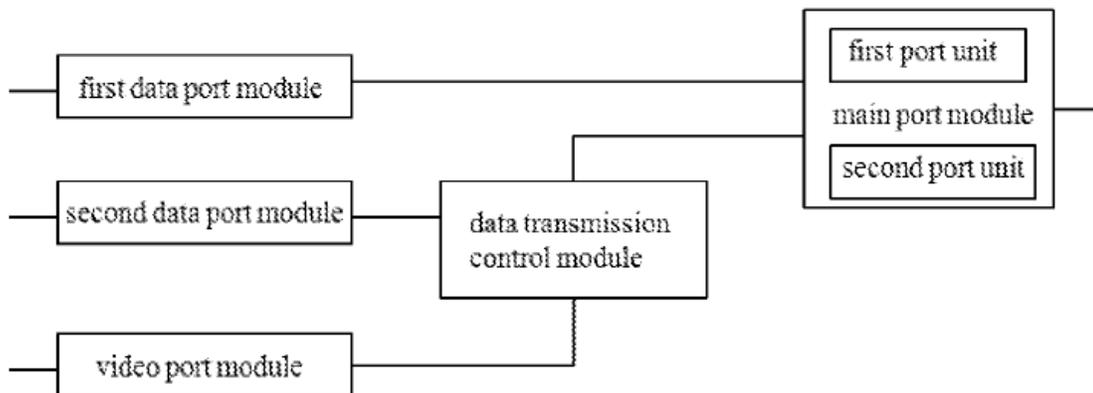
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embodiments, when the to-be connected device 110 connects to the first data port module 20, *data directly transmits* between the first data port module 20 and the end-user device 120 *via main port module 10.*” *Id.* at 3:39–42 (emphases added). Nothing in the ’429 patent indicates that a main port module is merely two port units attached to the substrate of the overall system. *Id.* at 3:5–6:32, Figs. 1, 2.

During the prosecution of the ’429 patent, Applicant differentiated claim 1 from the prior art, asserting that the “first and second port units are contained in the main port module.” Ex. 1002, 66–67, 75. As support, Applicant submitted a diagram (reproduced below). *Id.*



The Applicant’s diagram above clearly shows that the main port module is a separate component having a defined and distinct boundary.

For these reasons, we clarify that a main port module is a component having a defined and distinct boundary, not merely port units attached to the substrate of the overall system.

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e. Patent Owner’s “only two port units” construction

Patent Owner argues that “the proper construction of this term is that the main port module should have two and only two port units” because the ’429 patent “does not explain how more than two such ports could be integrated into the device 100.” PO Resp. 6. (citing Ex. 1001, 4:7–11, Fig. 2; Ex. 2018 ¶ 39 (the Declaration of Jacob Baker, Ph.D.)²). Patent Owner also contends that the transitional term “[h]aving,” for instance, does not create a presumption that the body of the claim is open.” *Id.* (citing *Crystal Semiconductor Corp. v. TriTech Microelectronics*, 246 F.3d 1336, 1348 (Fed. Cir. 2001)). Petitioner counters that the District Court already rejected that construction. Reply 2 (citing Ex. 1036, 11³; Ex. 1035, 20).

We decline to adopt Patent Owner’s construction that requires “only two port units,” as it would improperly import a limitation from a preferred embodiment into the claims. The Federal Circuit “has repeatedly cautioned against limiting the claimed invention to preferred embodiments or specific examples in the specification.” *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1346–47 (Fed. Cir. 2015). “[I]t is the *claims*, not the written

² Our references to Exhibit 2018 in this Decision are to Dr. Baker’s Declaration. Patent Owner also filed a declaration from an attorney seeking admission *pro hac vice* as Exhibit 2018.

³ The District Court adopted the Special Master’s construction. Ex. 1036, 10–14 (District Court’s Order). The original Special Master’s Report and Recommendation Regarding Claim Construction (“R&R”) (Ex. 2021) and the Amended R&R (Ex. 1035) set forth the same construction for element 1.1.

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description, which define the scope of the patent right.” *Id.* at 1346.

The Court in *Crystal Semiconductor* explained that “[t]he ‘having’ can also make a claim open,” and “examine[d] the claim in its full context to determine whether [the patent owner’s] use of ‘having’ limits [the claim] to its recited elements.” 246 F.3d at 1348.

Here, the claim language itself does not limit the term “having” to a closed meaning because the preamble uses the open-ended transitional phrase “comprising,” signaling the intent to have an open-ended claim. Ex. 1001, 6:45–46. The Specification and the prosecution history also do not support Patent Owner’s construction that requires “only two port units.” We agree with the District Court that “[t]here is no evidence in either the specification or prosecution of the ’429 Patent of a disavowal, either explicitly or implicitly, of any claim scope regarding the number of port units in the main port module 10.” Ex. 1035, 15–21; Ex. 1036, 10–14. As the Special Master explained, “[t]he specification of the ’429 Patent does not describe ‘exactly two port units,’” rather “the specification states that ‘[a]s shown in FIG. 2 main port module 10 includes a first port unit 11 and a second port unit 12.’” Ex. 1035, 18–19 (quoting Ex. 1001, 4:5–6). The Special Master also noted that the term “including” or “containing” is “inclusive or open-ended and does not exclude additional, unrecited elements or method steps.” *Id.* (quoting the Manual of Patent Examining Procedure (“MPEP”), § 2111.03(I)). Moreover, the District Court determined that “the claim language here, read in light of the specification’s description of the module as *including* a first and second port, does not

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exclude the possibility that the module may have additional port units, and [Patent Owner’s] argument on this point is declined.” Ex. 1036, 11. The District Court also explained that, absent clear disavowal, Figure 2 of the ’429 patent, “showing an example port extension apparatus” (Ex. 1001, 4:4–5), does not support Patent Owner’s argument because Figure 2 “shows one, though not the only possible, embodiment of the claimed invention,” and “[s]uch an embodiment is ‘not meant to represent ‘the’ invention or to limit the scope of . . . the claims themselves.’” Ex. 1036, 12 (quoting *Gart v. Logitech, Inc.*, 254 F.3d 1334, 1342 (Fed. Cir. 2001)). The District Court further found that “the prosecution history lacks the unequivocal and unambiguous disavowal of claim scope required for prosecution disclaimer to apply” because the ’429 patent “was not distinguished from prior art on the grounds that it had exactly two port units.” *Id.* at 14; *see also* Ex. 1035, 15–21 (“The Applicant never argued its device was distinguishable from *Muhammad* because of the number of port units, only that the location of the first and second port units was different because they were ‘contained in the main port module.’”).

Therefore, we decline to adopt Patent Owner’s construction that requires “only two port units.” To be clear, that construction would not change our analysis for Grounds 1 and 2 because, as discussed in Section II.F.1.b below, Kwon discloses a main port module having only two port units. Ex. 1005, Fig. 2.

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f. Conclusion on the construction of “main port module”

In short, we construe element 1.1 as “a component interacting with a larger system and having a defined boundary distinct from other modules in the system, wherein the component contains first and second units for directly connecting to an end-user device.” We clarify that the port units are not required to be completely contained within the main port module. We also clarify that a main port module is a component having a defined and distinct boundary, not merely port units attached to the substrate of the overall system. Further, we decline to adopt Patent Owner’s implicit constructions that require a material component of the port units to be located inside the main port module or require only two port units.

2. “data transmission control module”

Both parties proffer the District Court’s construction, construing a “data transmission control module” or DTCM as “a component interacting with a larger system and having a defined boundary distinct from other modules in the system that electronically transfers information between the end-user device and the to-be-connected device.” PO Resp. 7; Reply 2–3; Ex. 1036, 15–19. We agree with that construction as it is consistent with the claim language and Specification.

Patent Owner argues that a pertinent artisan would have understood that “component” in that construction is a “data transmission controller performing in accordance with an industry standard data transmission protocol.” PO Resp. 7–9 (citing Ex. 2018 ¶ 41; Ex. 1001, 3:43–48,

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4:11–16, 5:9–14, 5:17–23; 5:62–6:8). Patent Owner also contends that “[a]s of the ’429 Patent’s priority date, certain data transmission controls existed in the prior art in the form of commercially available integrated circuits known as hub controllers,” including “controllers for transmitting data in accordance with one or more of the USB or other data transmission protocols,” and that a pertinent artisan “would have been aware of these standards and exemplary commercially available integrated circuits implementing these standards.” *Id.* at 9 (citing Ex. 2018 ¶¶ 46, 84–88).

We decline to adopt Patent Owner’s construction. The Specification discloses that, “[i]f the to-be-displayed information does not need any mode conversion, the to-be-displayed *information will be directly delivered* to the to-be-connected device 110 to display.” Ex. 1001, 5:58–61 (emphasis added). Element 1.8 recites that the DTCM “receives the to-be-displayed information from the end-user device to the to-be-connected device to display.” Moreover, Patent Owner’s construction would render the data transmission control limitation in element 1.6 superfluous. *Stumbo v. Eastman Outdoors, Inc.*, 508 F.3d 1358, 1362 (Fed. Cir. 2007) (denouncing claim constructions which render phrases in claims superfluous); *Bicon Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006) (holding that “claims are interpreted with an eye toward giving effect to all terms in the claim”).

In short, we construe DTCM as “a component interacting with a larger system and having a defined boundary distinct from other modules in the system that electronically transfers information between the end-user device and the to-be-connected device.” We decline to adopt Patent Owner’s

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construction that requires a “data transmission controller performing in accordance with an industry standard data transmission protocol.”

3. “transmission path”

Element 1.3 recites

when a to-be-connected device connects to the first data port module, the first data port module and the main port module form a *transmission path* enabling data transmission between the to-be-connected device and the end-user device.

Ex. 1001, 6:61–65 (emphasis added). Patent Owner asserts that element 1.3 should be construed to require forming “a direct transmission path that does not proceed through [the] data transmission control module.” PO Resp. 10–11 (citing Ex. 2018 ¶ 48; Ex. 1001, 3:43–38). Petitioner does not dispute this assertion. Reply 2–3. In light of the Specification, we agree. The Specification discloses:

In all embodiments, when the to-be-connected device 110 connects to the first data port module 20, *data directly transmits* between the first data port module 20 and the end-user device 120 *via main port module 10*.

Different from the first data port module 20, when the to-be-connected device 110 connects to other port modules (e.g., the second data port module 40, the video port module 50), data transmission needs to pass through the data transmission control module 30 between the to-be-connected device 110 and the end-user device 120.

Ex. 1001, 3:39–48, Fig. 2 (emphases added).

In short, we construe element 1.3 to require forming a direct transmission path that does not proceed through the DTCM. *See Verizon*

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Servs. Corp. v. Vonage Holdings Corp., 503 F.3d 1295, 1308 (Fed. Cir. 2007) (“When a patent thus describes the features of the ‘present invention’ as a whole, this description limits the scope of the invention.”).

4. “operatively connecting”

Each of elements 1.2, 1.4, 1.5, and 1.7 recites the term “operatively connecting.” In its Response, Patent Owner asserts that the parties have agreed to construe “operatively connecting” as “joining to facilitate direct data transmission.” PO Resp. 11–12. In its Reply, Petitioner agrees with Patent Owner. Reply 3. However, Patent Owner avers in its Sur-reply that “operatively connecting” does not require a direct connection, arguing that the ordinary meaning of the term, the Specification, and prosecution history do not require a direct connection. Sur-reply 2–3.

We need not determine whether the term “operatively connecting” requires direct connections to resolve the issues before us in this proceeding. *Realtime Data*, 912 F.3d at 1375. Even under the construction that requires a direct connection, it would not change our prior art analysis because, as discussed in Sections II.E, II.F, and II.I below, the prior art discloses direct connections.

B. 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 said

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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 ordinary skill in the art; and (4) when in evidence, objective evidence of non-obviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

C. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation and quotation marks omitted). Here, Petitioner asserts that one of ordinary skill in the art in the context of the ’429 patent would have had “at least a bachelor’s degree in electrical engineering or equivalent coursework, and at least a year of experience developing electronic device accessories including port hubs and port extenders,” citing the Declaration of Paul Franzon, Ph.D., for support. Pet. 7–8 (citing Ex. 1003 ¶ 23).

Patent Owner argues that “[t]his level of skill is low” and that “[s]uch a relatively low level of skill means that it is less likely that a [person of ordinary skill in the art] would find the claims of the 429 patent obvious.” PO Resp. 47. However, Patent Owner’s characterization is not meaningful

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in view of the prior art of record. Notably, Patent Owner admits that “[a]s of the 429 Patent’s priority date, certain data transmission controls existed in the prior art in the form of commercially available integrated circuits known as hub controllers.” PO Resp. 9; Ex. 2018 ¶¶ 46, 84–88; Exs. 2024–2028.

To the extent necessary, we adopt Petitioner’s assessment of the level of ordinary skill in the art, with the exception of the open-ended language “at least,” because it is consistent with the ’429 patent and the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

D. Overview of the Asserted Prior Art

1. Kwon (Exhibit 1005)

Kwon discloses a docking station for a laptop computer. Ex. 1005, code (57), 1:24–34, 2:47–49. Petitioner’s annotated Figure 2 of Kwon is reproduced below. Pet. 14.

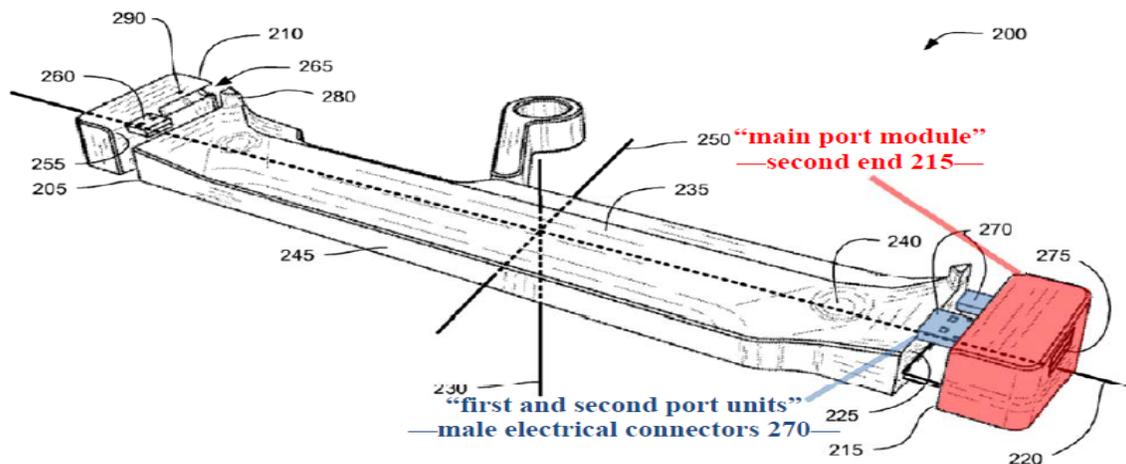


Figure 2 of Kwon above shows docking station system 200 comprising crossbeam 205 connected to first end member 210 and second end member

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215 (red). Ex. 1005, 5:1–4. Second end member 215 includes two male connectors 270 (with outer portions in blue) configured to engage with female electrical connectors of laptop 600, shown in Figure 6 of Kwon (reproduced below with annotations added by Petitioner (Pet. 12)).

Ex. 1001, 7:1–24.

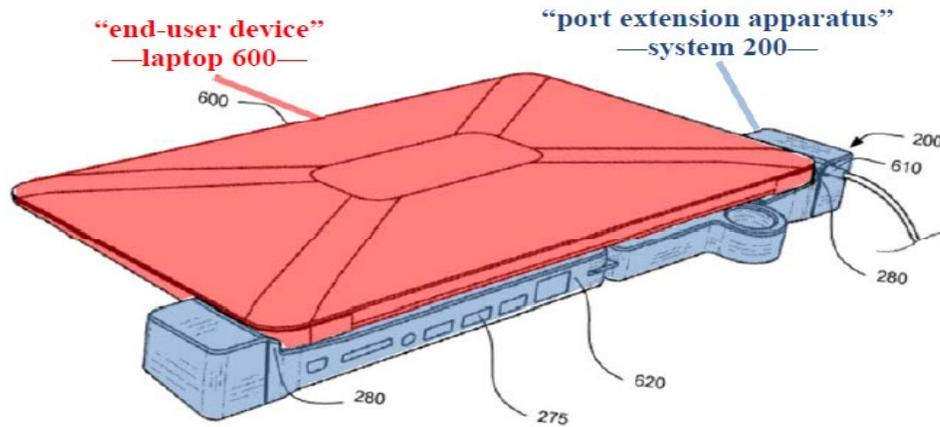


FIG. 6

Figure 6 of Kwon above shows docking station system 200 (blue) securing laptop 600 (red). *Id.* at 10:21–24. System 200 includes nine female connectors 275 for connecting peripheral devices to communicate with laptop 600. *Id.* Male connectors 270 include, e.g., a USB port or a Thunderbolt port. *Id.* at 6:13–20, 63–67. Female connectors 275 include, e.g., Video Graphics Array (“VGA”) output port for an external monitor, a DisplayPort, a Thunderbolt port, a port to receive a flash memory card (SD Card, Memory stick, or xD card), and a USB hub. *Id.* at 10:32–39. There can be a 1:1 correspondence of female connectors 275 to male connectors 270, and multiple female connectors 275 to one male connector 270 through a hub, switching circuitry, or splitting circuitry. *Id.* at 7:19–24.

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2. Kuo (Exhibit 1006)

Kuo describes a docking station having a circuit board and a control system. Ex. 1006, code (57). Figure 4 of Kuo is reproduced below.

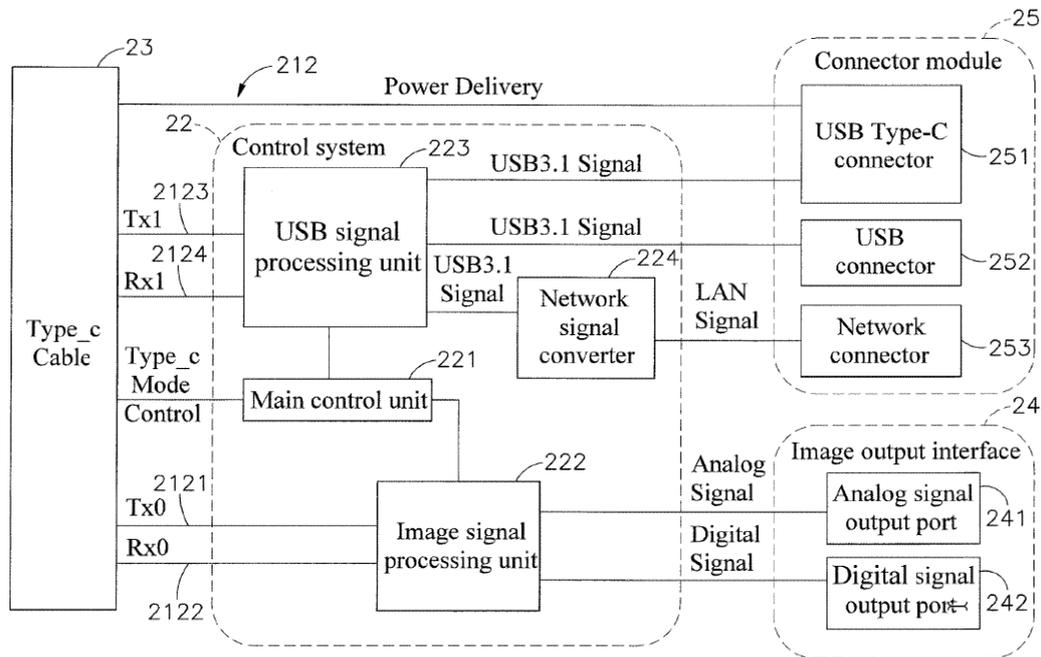


Figure 4 of Kuo above shows a circuit block diagram of the module of the docking station. *Id.* ¶ 16. Control system 22 comprises main control unit 221, image signal processing unit 222, USB signal processing unit 223, and network signal converter 224. *Id.* ¶ 21. The docking station also includes image output interface 24 and connector module 25. *Id.* ¶ 23. Image output interface 24 includes analog signal output port 241 (e.g., VGA connector) and digital signal output port 242 (e.g., High-Definition Multimedia Interface (“HDMI”) or Digital Visual Interface (“DVI”) connector) connected to image signal processing unit 222. *Id.* Connector module 25 comprises USB Type-C connector 251 and USB connector 252 connected to

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USB signal processing unit 223. *Id.* Connector module 25 also includes network connector 253 connected to network signal converter 224. *Id.*

3. O'Shea (Exhibit 1007)

O'Shea discloses a connector device for coupling to a laptop computer. Ex. 1007, code (57). Figure 1 of O'Shea is reproduced below.

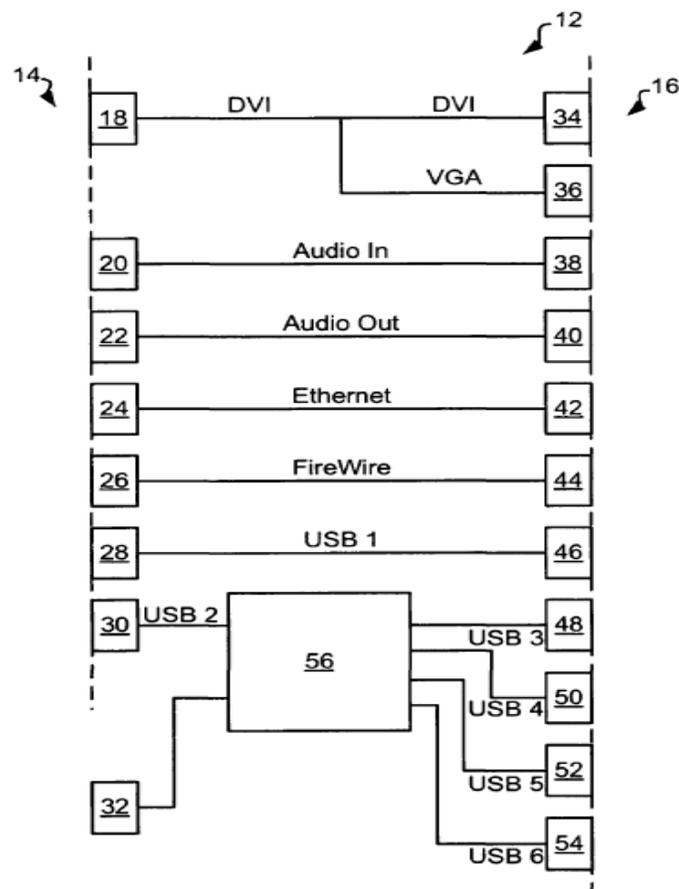


Figure 1 of O'Shea above shows a function block diagram of a connector device. *Id.* at 2:54–56. Connector device 16 includes eight input ports 14 and eleven output ports 16. *Id.* at 2:57–58. Input ports 14 include mini-DVI port 18, audio input port 20, audio output port 22, Ethernet port 24, FireWire

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port 26, two USB ports 28, 30, and USB power port 30. *Id.* at 2:58–63. Output ports 16 include full size DVI port 34, full size VGA monitor port 36, audio input port 38, audio output port 40, Ethernet port 42, FireWire port 44, and five USB ports 46, 48, 50, 52, 54. *Id.* at 2:63–67. As shown in Figure 1 of O’Shea, USB input port 28 is directly connected to USB output port 46 (having a 1:1 direct connection), while USB output ports 48, 50, 52, 54 are connected to USB input ports 30 and 32 via hub 56. *Id.* at 4:15–28.

4. Chang (Exhibit 1008)

Chang discloses a multi-interface connector device. Ex. 1008, code (57). Figure 1 of Chang is reproduced below.

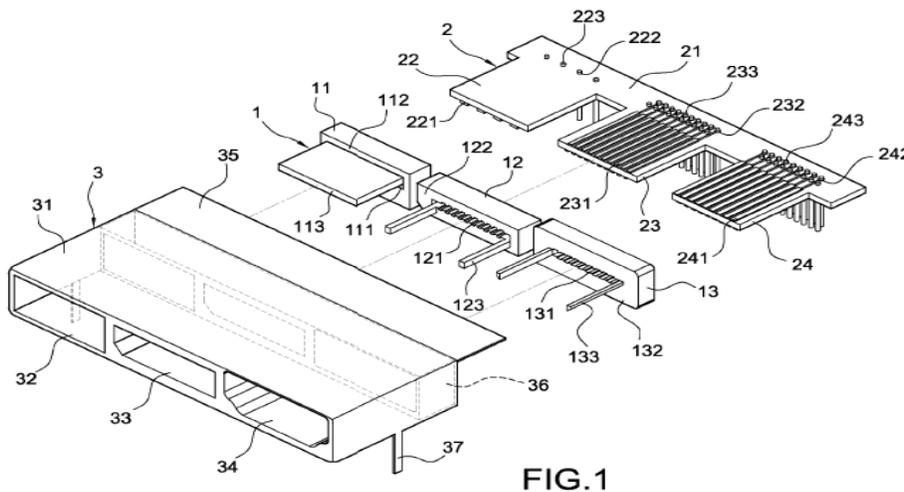


Figure 1 of Chang above illustrates a connector. Ex. 1008 ¶ 25. Casing 3 surrounds a plurality of housings 1, which accommodate tongue plates 22–24 of circuit board 2. *Id.* Tongue plate 22–24 of circuit board 2 provide a USB port, a display port, and a HDMI port. *Id.* ¶ 37. Housings 1 insulate the ports and have perforations 111, 121, 131 for receiving and supporting

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respective tongue plates 22–24 of circuit board 2, which host connector pins 221, 231, 241 of the ports. *Id.* ¶¶ 26–31. Three sets of terminals 223, 233, 243 exit the bottom surface of circuit board 2 for connecting their respective ports to an underlying main board 51. *Id.* ¶¶ 27, 28, 32, 34, 35.

E. Whether Kuo is Qualified as Prior Art

1. Petitioner’s initial burden of production

“In an [IPR], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic, v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). This burden of persuasion never shifts to patent owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). The petitioner also has the initial burden of production to show that an asserted reference qualifies as prior art under § 102. *Id.* at 1379. Once the petitioner has met that initial burden, the burden of production shifts to the patent owner to argue or produce evidence that either the asserted reference does not render the claims unpatentable or the reference is not prior art. *Id.* (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327 (Fed. Cir. 2008)).

Petitioner argues that Kuo is prior art under § 102(a)(2) because it is a published patent application with an effective filing date before the ’429 patent’s priority date of **April 27, 2017**. Pet. 4; Reply 3; Ex. 1001, code (30). On its face, Kuo was filed on February 17, 2017, claiming foreign priority to a Taiwanese Application No. 105218991 (“the ’991 application”) filed on **December 13, 2016**. Ex. 1006, codes (22), (30); Ex. 1038

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(Certified Translation of the '991 application). Therefore, Petitioner has met its initial burden of showing that Kuo qualifies as prior art.

2. Prior art exception under 35 U.S.C. § 102(b)(2)(B)

a. Relevant statute and guidelines

35 U.S.C. § 102(b)(2)(B) provides that:

DISCLOSURE APPEARING IN APPLICATIONS AND PATENTS.—A disclosure shall not be prior art to a claimed invention under subsection (a)(2) if . . .

(B) the subject matter disclosed had, before such subject matter was effectively filed under subsection (a)(2), been publicly disclosed by the inventor or a joint inventor or another who obtained the subject matter disclosed directly or indirectly from the inventor or a joint inventor.

The Office's Guidelines provides the following:

[T]he exception in 35 U.S.C. 102(b)(2)(B) requires that the subject matter in the prior disclosure being relied upon under 35 U.S.C. 102(a) be the same “subject matter” as the subject matter publicly disclosed by the inventor before such prior art disclosure for the exception in 35 U.S.C. 102(b)(2)(B) to apply.[□]

Even if the only differences between the subject matter in the prior art disclosure that is relied upon under 35 U.S.C. 102(a) and the subject matter publicly disclosed by the inventor before such prior art disclosure are mere insubstantial changes, or only trivial or obvious variations, the exception under 35 U.S.C. 102(b)(2)(B) does not apply.

Examination Guidelines for Implementing the First-Inventor-to-File Provision of the Leahy-Smith America Invents Act, 77 Fed. Reg. 43759, 43769 (July 26, 2012); *see also* Examination Guidelines for Implementing

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the First-Inventor-to-File Provision of the Leahy-Smith America Invents Act, 78 Fed. Reg. 11059, 11061 (Feb. 14, 2013); MPEP § 717.01(b)(2) (9th Ed., Rev. 10.2019 (June 2020)).

In short, the “subject matter” in § 102(b)(2)(B) refers to the disclosure of the prior art reference and the exception under § 102(b)(2)(B) only applies when the “subject matter” of the prior art reference and the inventor’s prior public disclosure are the same.

b. Parties’ arguments

Patent Owner attempts to disqualify Kuo as prior art, arguing that the Hyperdrive, the product allegedly embodying claim 1 of the ’429 patent, was publicly disclosed before Kuo’s effective filing date. PO Resp. 22–26 (citing Ex. 2018 ¶¶ 241–242; Ex. 2070 (Invalidity Claim Chart); Ex. 2069 (Wayback Machine print out of Kickstarter.com Hyperdrive project for December 7, 2016); Ex. 2032 ¶¶ 12–32 (Declaration of Mr. Yuwen Chen, Head of Product for Sanho); Ex. 2102 ¶¶ 17, 21, 26 (Declaration of Mr. Zhuowen Liao, the sole named inventor for the ’429 patent)).

Petitioner counters that Patent Owner fails to show that Kuo’s subject matter was publicly disclosed before its effective filing date because the Hyperdrive is not the same subject matter as Kuo. Reply 5–6. According to Petitioner, Kuo’s subject matter includes a single-chipset DTCM, but the Hyperdrive does not have a single-chipset DTCM. *Id.* (citing Ex. 1046 ¶ 6 (Dr. Franzon’s Supplemental Declaration); Ex. 1043, 70:9–20 (Transcript of Mr. Chen’s Deposition); Ex. 1044, 107:17–108:18 (Transcript of Mr. Liao’s

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Deposition)). Petitioner also avers that Kuo’s DTCM is directly connected to the second port unit and the video port module, while the Hyperdrive’s is not. *Id.* at 6–7 (citing Ex. 1046 ¶¶ 7–10, 18–25). Petitioner further argues that “[n]either the inventor nor Sanho publicly disclosed the Hyperdrive’s internal configuration before Kuo’s effective filing date.” *Id.* at 7.

In its Sur-reply, Patent Owner argues that “the subject matter of Kuo that the Petition relies upon – including the DTCM connecting to data port modules and a video port module – was already publicly disclosed by the Hyperdrive before its effective filing date.” Sur-reply 9–16. According to Patent Owner, the published articles describing features of the Hyperdrive, pictures publicly available depicting the circuit board of the Hyperdrive, and a sale of the Hyperdrive having the elements of claim 1 of the ’429 patent each constitute a public disclosure under § 102(b)(2)(B). *Id.* at 10. Patent Owner avers that “[t]he Hyperdrive employed a VSLI chip,” which discloses a DTCM. *Id.* at 14 (citing Ex. 1042, 50:21–51:1 (Transcript of Dr. Baker’s Deposition); Ex. 2032 ¶ 26; Ex. 2018 ¶¶ 71–73, 76).

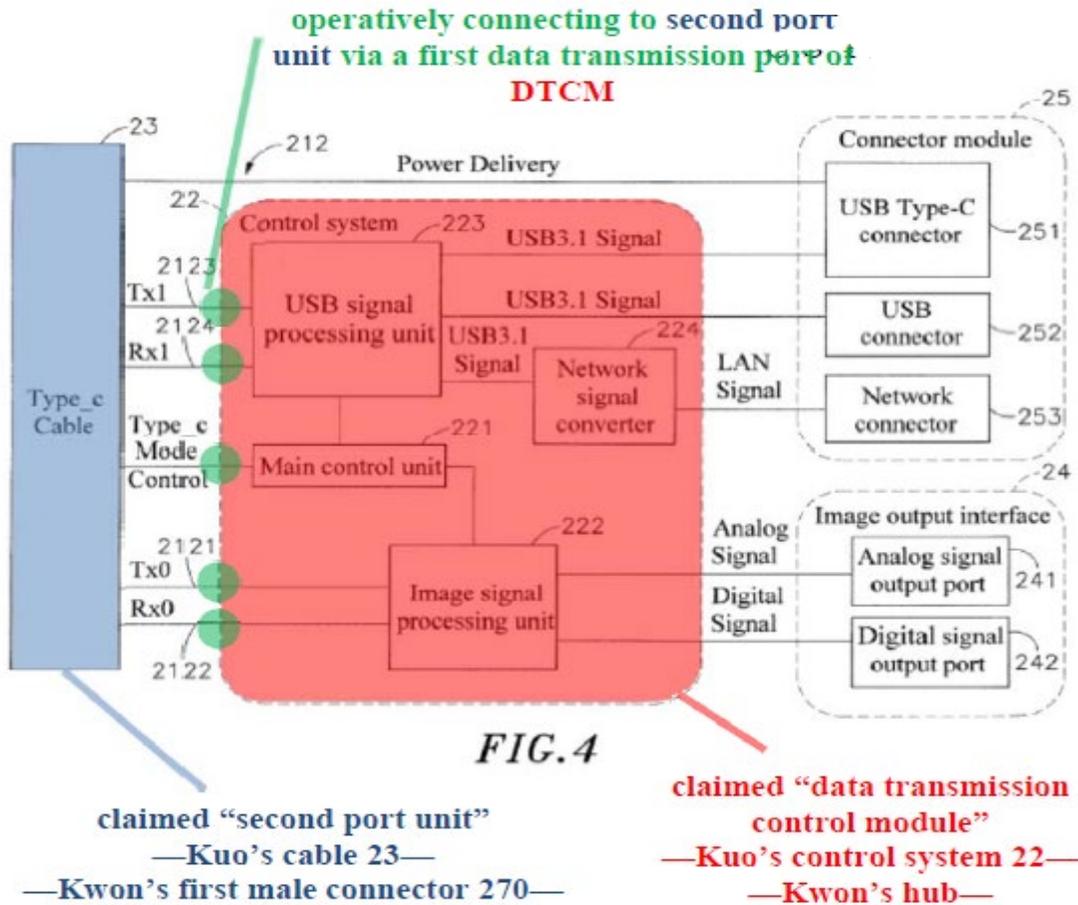
c. The subject matter of Kuo

To identify the “subject matter” under § 102(b)(2)(B), we focus our analysis on the teachings of Kuo relied upon by Petitioner. As to element 1.4, Petitioner relies on Kuo to teach the specific details about a hub and how it connects multiple female connectors to a male connector via a hub. Pet. 20. In particular, Petitioner relies on Kuo to disclose a docking station with a hub (a single chipset control system 22) that extends a USB-C port of

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a laptop into multiple output interface ports 24, 25 for connecting to peripheral devices. *Id.* at 20–23 (citing Ex. 1006, code (57), ¶¶ 23–26, Figs. 1, 2, 4). Petitioner’s annotated Figure 4 of Kuo is reproduced below.



Pet. 23. Annotated Figure 4 of Kuo above is a circuit block diagram of the module of the docking station. Petitioner relies on Figure 4 of Kuo to show that (1) Kuo’s control system 22 (red) controls data transmission between peripheral devices connected to output interface ports 24, 25 and cable 23 (blue) for the host computer; and (2) Kuo’s channels 2121–2124 (green)

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teaches a first DTP that operatively and directly connects cable 23 to control system 22. *Id.* at 23–24 (citing Ex. 1006 ¶¶ 21, 22, 25).

As to elements 1.5 and 1.6, Petitioner relies upon (1) Kuo’s connectors 251–253 to teach a second data port module operatively and directly connecting to a second DTP of the DTCM; and (2) Kuo’s control system 22 that has main control unit 221, network signal converter 224, and USB signal processing unit 233 to teach a DTCM that controls data transmission between connectors 251–253 and the host computer. *Id.* at 30–32 (citing Ex. 1006 ¶¶ 21, 23, 25, 26, Fig. 4).

With respect to elements 1.7 and 1.8, Petitioner relies on (1) Kuo’s analog signal output port 241 and digital signal output port 242, which electrically and directly connect to image signal processing unit 222 of control system 22 via the respective ports of the control system, to teach the claimed video port module; and (2) Kuo’s main control unit 221 and image signal processing unit 222 for receiving and processing to-be-displayed video information. *Id.* at 33–35 (citing Ex. 1006 ¶¶ 21, 23, 26).

For claim 2, which requires a third data port module and a memory card read/write module, Petitioner relies on Kuo’s network connector 253, and USB connector 252. *Id.* at 36–38 (citing Ex. 1006, Fig. 4). As to claim 4, Petitioner relies on Kuo’s control system 22 that comprises main control unit 221, USB signal processing unit 223, and mode conversion unit 222. *Id.* at 39–42 (citing Ex. 1006 ¶¶ 21, 24–26, Fig. 4). For claim 5, which requires the first DTP of the DTCM to comprise a first data port of the USB control unit, a first data port of the mode control unit, and a first data port of

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the mode conversion unit, Petitioner relies upon Kuo’s termination of channels 2121–2124 of cable 23 at control system 22. *Id.* at 42–43 (citing Ex. 1006 ¶¶ 22, 25, Fig. 4). As to claim 6, which requires the second DTP of the DTCM to be a second data port of the USB control unit, Petitioner relies on Kuo’s connection of control system 22 to USB-C connector 251. *Id.* at 43–44 (citing Ex. 1006 ¶ 23, Fig. 4). With respect to claim 14, which requires the first data port module to comprise a Type-C female port or a Lightning female port, Petitioner relies on Kuo’s teachings that “USB3.1 Type-C is particularly expected by the market” and that control system 22 uses USB 3.1, which requires USB-C connectors and cables to support high-power charging and 10 Gbps data communication speed. *Id.* at 47 (citing Ex. 1006 ¶¶ 6, 21–26). For claim 15 that requires the second data port module to comprise a USB female port, Petitioner relies upon Kuo’s USB Type-C connector 251. *Id.* at 48 (citing Ex. 1006, Figs. 1, 2). As to claim 17, which requires the first port unit to comprise a Type-C male port or a USB male port and the second port unit to comprise a Type-C male port or a USB male port, Petitioner relies upon Kuo’s cable 23 that has a male USB-C connector. *Id.* at 49–50 (citing Ex. 1006 ¶ 21, Figs. 1–3).

d. Patent Owner’s evidence of public disclosure before the critical date

Patent Owner avers that the Hyperdrive was publicly disclosed as early as November 2016, and that it was on sale on December 6, 2016. PO Resp. 22–26; Sur-reply 10–11 (citing Ex. 2102 ¶¶ 3–4, 6–7, 11–18, 22–28; Ex. 2103 ¶¶ 2–6, 9–20, 25–26 (Declaration of Mr. Daniel Chin, the

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Owner and Chief Executive Office of Sanho); Exs. 2081–2084 (Communications between Mr. Liao and Mr. Chin); Ex. 2085 (Internal GoPod email dated October 31, 2016, allegedly a copy of email communications between Mr. Liao’s team concerning the Hyperdrive’s circuit board design (*see* Ex. 2102 ¶ 20)); Ex. 2086 (the Product PowerPoint Presentation dated November 16, 2016); Ex. 2087 (Hyperdrive purchase order dated December 6, 2016); Ex. 2088 (The signed commercial invoice for the order); Ex. 2089 (Hyperdrive internal GoPod Order dated December 6, 2016); Ex. 1045, 60:5–61:12 (Transcript of Mr. Chin’s Deposition)). Patent Owner also contends that Sanho published the Kickstarter campaign regarding the Hyperdrive on December 5, 2016, and that the press coverage was published before December 13, 2016. PO Resp. 21–26; Sur-reply 10–11 (citing Ex. 2069, 7; Exs. 2040–2043 (articles on the Hyperdrive); Ex. 2102 ¶ 7; Ex. 2103 ¶¶ 13–17; Ex. 1045, 60:5–61:12).

e. Discussion

For the reasons stated below, we find that Patent Owner fails to show that the inventor publicly disclosed the subject matter of Kuo before Kuo’s effective filing date. Patent Owner relies on the photographs of two different circuit boards to show that the Hyperdrive discloses the subject matter of Kuo. However, only one of them was publicly disclosed before Kuo’s effective filing date. Ex. 2032 ¶¶ 10, 24 (pages 5, 12); Ex. 2102

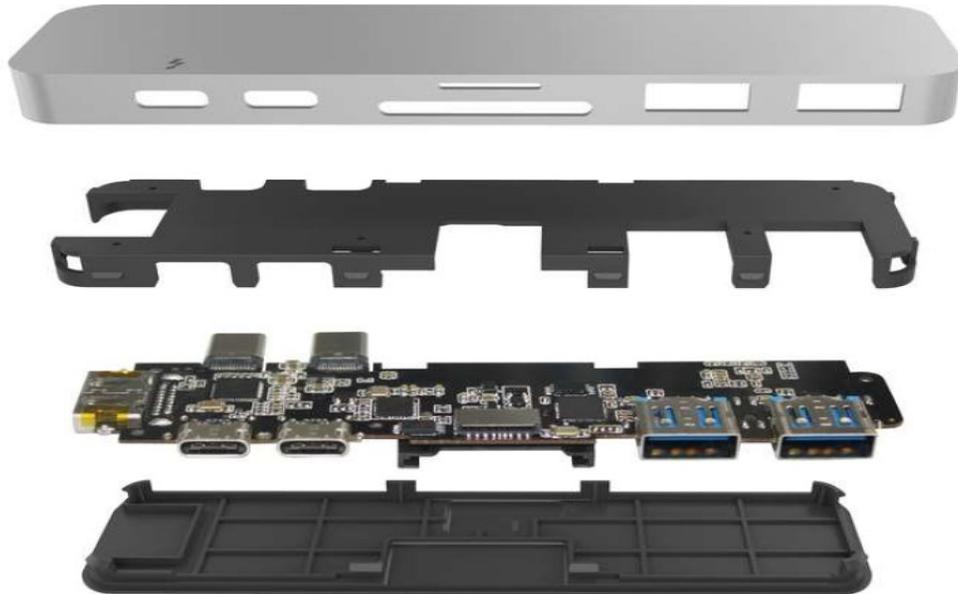
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¶ 26(b).⁴ Patent Owner fails to show that the other photograph was publicly disclosed before the critical date. Ex. 2119 (Patent Owner’s Demonstrative, which is not evidence), 33; Ex. 2032 ¶¶ 25–26 (page 13); Ex. 2102 ¶ 26(c).⁵

The photograph of the first circuit board is reproduced below.



The photograph of the first Hyperdrive’s circuit board above (but not the second Hyperdrive’s circuit board) appears in the Kickstarter publication, which was publicly disclosed on December 5, 2016. Ex. 2069, 19.

However, the photograph of the first Hyperdrive’s circuit board above does not disclose a single chipset DTCM, much less the direct connections between a DTCM and the port units or modules, as disclosed in Kuo.

⁴ The same photograph of the first circuit board appears in these Exhibits.

⁵ The same photograph of the second circuit board appears in these Exhibits.

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Notably, Dr. Franzon testifies that “[i]t is impossible to determine, from this image what parts of the device control the data transmission, if they are contained in a module with a defined boundary, or what the trace paths are between the various components of the device,” and that “[t]he image would not disclose the specific configuration of the Hyperdrive to the public.”

Ex. 1046 ¶ 11. We credit Dr. Franzon’s testimony, as it is consistent with other evidence of record.

Indeed, Mr. Chen admitted during cross-examination that it is not clear from that photograph what on the circuit board constitutes a DTCM. Ex. 1043, 45:19–25 (citing Ex. 2032, 5). In response to the question “[d]o you know what structure on the circuit board, shown on page 5 of your declaration, is the data transmission control module?” Mr. Chen admitted that “[n]ot from the page 5, not from the figure in page 5” of Exhibit 2032. *Id.* Mr. Chin also did not know what component in the first circuit board constitutes a DTCM. Ex. 1041 (WeChat Conversation between Mr. Liao and Mr. Chin from October 21, 2016 through December 12, 2016), 66–67. When Mr. Liao showed that photograph to Mr. Chin on December 3, 2016, Mr. Chin asked “[p]hoto above shows 3 chipsets. What are their purpose[s]? Which one is PD, Hub, card reader etc?” *Id.*

Dr. Baker, Mr. Chen, and Mr. Liao also admitted that it is impossible to determine the trace paths between the components from that photograph. Dr. Baker admitted that “I can’t see on the image the details of the connection between the chip and the connector,” and that “I can’t see the details of the printed circuit board.” Ex. 1042, 53:18–54:1. During

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Mr. Chen’s cross-examination, in response to the question “On the image above paragraph 26 of your declaration, are you able to identify the trace path that directly connects the second port unit with the data transmission control module?,” Mr. Chen admitted that “[n]o. I won’t be able to do that. That will require the schematics to know the exact data paths.” Ex. 1043, 47:5–48:16 (citing Ex. 2032 ¶¶ 25–26 (page 13)). During Mr. Liao’s cross-examination, in response to the question “[c]an you identify trace path between the various components . . . in the photograph on page 10 of Exhibit 2102?” Mr. Liao admitted that “[i]t will be very difficult to identify the trace path to see where it goes.” Ex. 1044, 108:20–109:13 (citing Ex. 2102, 10).

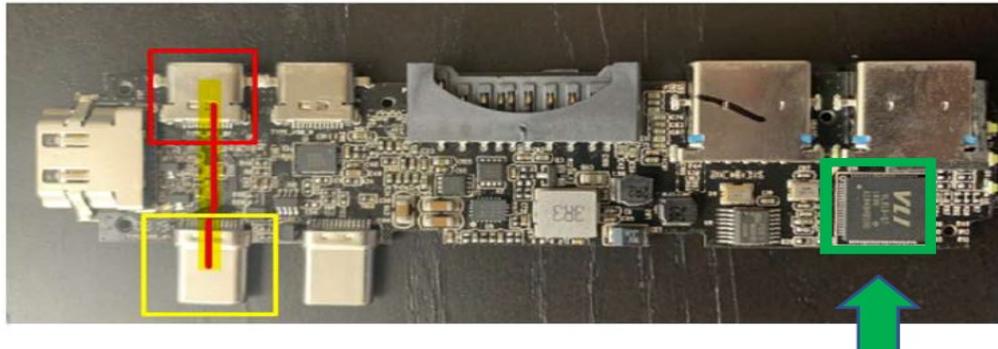
Hence, we find that Patent Owner fails to show that the photograph of the first Hyperdrive’s circuit board discloses the subject matter of Kuo. For example, unlike Kuo, that photograph does not disclose a single chipset DTCM operatively connecting to the second port unit via a first DTP of the DTCM, as recited in element 1.4. Unlike Kuo, that photograph also does not disclose a second data port module operatively connecting to a second DTP of the DTCM, as recited in element 1.5. Unlike Kuo, that photograph also does not disclose a video port module operatively connecting to a third DTP of the DTCM, as recited in element 1.7.

In addition, Patent Owner argues that the single VLSI chip shown in the photograph of a second circuit board discloses the claimed DTCM. Sur-reply 14. The photograph of the second circuit board is reproduced below with annotations added by Patent Owner.

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The second circuit board shown above is different from the first circuit board. *Compare* Ex. 2119, 33, *with* Ex. 2069, 19. Patent Owner argues that the second circuit board was disclosed with the Kickstarter publication. Sur-reply 14. However, that argument is conclusory, and not supported by the Kickstarter publication (Ex. 2069). None of Patent Owner’s evidence shows that the second circuit board was publicly disclosed before the critical date. Neither Mr. Chen’s testimony nor Dr. Baker’s testimony supports Patent Owner’s argument, because nothing in their testimony shows the publication date of the second circuit board photograph. Ex. 2032 ¶¶ 25–26; Ex. 1042, 50:21–51:1.

Further, Mr. Chin’s testimony that the Hyperdrive’s VLSI chip was publicly disclosed on December 5, 2016, is conclusory. Ex. 2103 ¶¶ 25–26. As discussed above, only the photograph of the first circuit board appeared in the Kickstarter publication, not the second circuit board. Ex. 2069. None of the evidence cited by Mr. Chin shows the second circuit board. Exs. 2081, 2082, 2094, 2086, 2069, 2097, 2087, 2088, 2098, 2093, 2096, 2095, 1006. Tellingly, on December 3, 2016, when Mr. Liao showed the

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first circuit board to Mr. Chin, Mr. Chin did not know what component constitutes a DTCM, asking “[p]hoto above shows 3 chipsets. What are their purpose[s]? Which one is PD, Hub, card reader etc?” Ex. 1041, 66–67. Thus, Mr. Chin’s testimony is conclusory. Ex. 2103 ¶¶ 25–26.

In short, Patent Owner fails to show that the photograph of the second circuit board was publicly disclosed before Kuo’s effective filing date. Therefore, the subject matter in that photograph cannot be relied on for disqualifying Kuo as prior art under § 102(b)(2)(B).

In addition, the photograph of the second circuit board does not disclose the subject matter of Kuo. Like the first circuit board, the second circuit board does not show the trace paths or connections between the various components of the device, as disclosed in Kuo. Furthermore, the chip on the second circuit board merely discloses what was well-known in the art. Patent Owner admits that “[a]s of the 429 Patent’s priority date, certain data transmission controls existed in the prior art in the form of commercially available integrated circuits known as hub controllers.” PO Resp. 9. Dr. Baker admits that “manufacturers of computers, connectors and peripherals came to market with numerous integrated circuits that implemented the USB . . . hubs connecting the host with peripheral devices,” providing known examples in the art, e.g., a single integrated circuit (“IC”), USB Type-C, smart hubs supporting seven ports. Ex. 2018 ¶¶ 84–88.

Accordingly, Patent Owner also fails to show that the photograph of the second circuit board discloses the subject matter of Kuo. For the foregoing reasons, Patent Owner fails to show that the inventor’s prior

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public disclosure and the subject matter of Kuo are the same. We find that Kuo qualifies as prior art, not excluded under § 102(b)(2)(B).

F. Ground 1 – Obviousness Over Kwon and Kuo

Petitioner asserts that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over Kwon and Kuo (Ground 1). Pet. 11–50. Patent Owner opposes. PO Resp. 14–27. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over Kwon and Kuo.

1. Claim 1

a. Preamble – port extension apparatus

The preamble⁶ of claim 1 recites “[a] port extension apparatus for extending ports of an end-user device.” Petitioner argues that Kwon discloses docking station 200 (port extension apparatus) for laptop 600 (end-user device). Pet. 11. Petitioner explains that Kwon’s system 200 extends the ports of laptop 600 to female connectors 275. *Id.* at 12 (citing Ex. 1005, 7:1–24, Figs. 2, 6). Patent Owner does not dispute Petitioner’s showing. We find that Petitioner has shown sufficiently that Kwon discloses the preamble of claim 1.

⁶ We need not decide whether the preamble of claim 1 is limiting, as Petitioner has shown that the prior art discloses the subject matter recited in the preamble of claim 1.

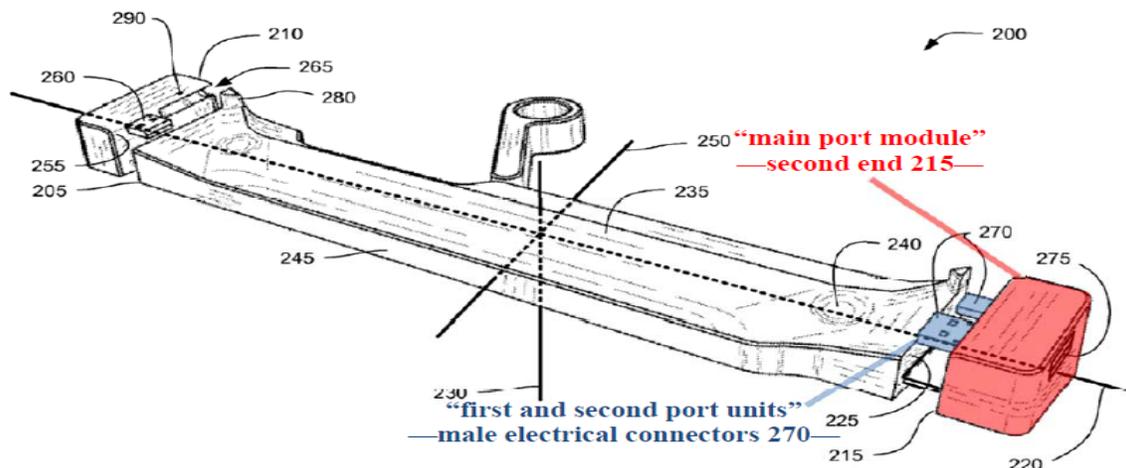
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b. Element 1.1 – main port module having first and second port units

Element 1.1 recites “a main port module for connecting to an end-user device, the main port module having first and second port units.” As discussed above, we construe element 1.1 as “a component interacting with a larger system and having a defined boundary distinct from other modules in the system, wherein the component contains first and second units for directly connecting to an end-user device.”

Petitioner asserts that Kwon teaches element 1.1. Pet. 13–16. Petitioner’s annotated Figure 2 of Kwon is reproduced below. *Id.* at 14.



Annotated Figure 2 above shows a docking station. System 200 comprises crossbeam 205 connected to first end member 210 and second end member 215 (red) that includes connectors 270 (blue). Ex. 1005, 5:2–4, 6:44–7:24.

Petitioner asserts that “Kwon has two male electrical connectors 270, that connect to the laptop when docked on the system, corresponding to the claimed first and second port units.” Pet. 13–14 (citing Ex. 1005, 6:44–7:24). Petitioner also asserts that second end member 215 discloses

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the claimed “main port module,” as shown in Figures 2 and 4 of Kwon, because “second end 215 of the housing contains the two connectors 270,” and it “is a distinct module separate from, e.g., the crossbeam module 250.” *Id.* (citing Ex. 1005, 5:33–37, 6:44–7:24; Ex. 1003 ¶ 46, Figs. 2, 4).

In its Response, Patent Owner counters that “Kwon’s second male connector 270 ‘extends from the surface’ of end unit 215 towards crossbeam 205,” and that “[n]either the Petition nor [Dr.] Franzon’s Declaration provides any analysis or explanation of why or how end unit 215 (main port module) ‘contains’ (*i.e.*, holds within) second male connector 270.” PO Resp. 16 (citing Ex. 1005, 6:46–48; Ex. 2018 ¶¶ 125–126).

In its Reply, Petitioner counters that “[t]he Petition explains how Kwon’s second end unit 215 (main port module), which is a housing, contains the male electrical ports 270 (first and second port units), and it is evident from Kwon’s figures.” Reply 11. Petitioner asserts that “portions of Kwon’s electrical ports 270 are partially contained within the second end unit 215 . . . because the ports are in electrical communication with other ports.” *Id.* at 11–12 (citing Ex. 1005, 6:55–7:24).

In its Sur-reply, Patent Owner argues that “[t]he containment of both port units is a requirement of the construction of element [1.1],” and that “Kwon’s connectors 270 are not ‘surrounded by’ its end unit 215.” Sur-reply 4. Patent Owner contends that “two connectors 270 are mounted on the second end housing module 215,” and that Kwon’s “connector units (270) are external to the housing 215.” *Id.* at 4–5. Patent Owner also avers that Kwon does not show that connectors 270 are partially “contained

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within” the housing of 215. *Id.* at 7. Patent Owner further submits that Petitioner presents improper new arguments. *Id.* at 6–7.

We find that Petitioner has shown sufficiently that Kwon teaches element 1.1. It is undisputed that Kwon’s second end member 215 includes two male connectors 270 that connect to the laptop when docked on the system. Pet. 13 (citing Ex. 1005, 6:44–7:24, Fig. 2); PO Resp. 16. Kwon also discloses that connectors 270 “are configured to engage with respective female electrical connectors of the computing device.” Ex. 1005, 7:1–3.

We disagree with Patent Owner’s argument that Kwon’s male connectors 270 extend from the surface of end unit 215, not surrounded by end unit 215, and, therefore, that they are not partially “contained within” the housing of end unit 215. PO Resp. 16; Sur-reply 4–7. As discussed above in Section II.A.1.b, we clarify that the port units are not required to be completely contained within the main port module. Moreover, Patent Owner and Dr. Baker admit that male connectors 270 in Kwon are examples of port units. Tr. 49:11–13; Ex. 2018 ¶ 147. Indeed, Kwon discloses that male connectors 270 are partially contained within second end unit 215 because “system 200 also includes outward-facing female electrical connectors 275 in electrical communication with the electrical connectors . . . 270 so that a peripheral device can be attached to the system 200 to communicate with the computer device through one of the electrical connectors . . . 270.” Ex. 1005, 6:55–7:24, Fig. 2. Thus, a material component of each connector 270 is located inside second end unit 215.

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We also disagree with Patent Owner’s argument that Petitioner presents improper new arguments. According to Patent Owner, (1) the Reply cites to Figures 2–4 of Kwon, but the Petition did not cite to Figure 3; (2) the Reply cites to new parts of Kwon (Ex. 1005, 6:55–7:24); and (3) Petitioner’s “partially contain” argument is new. Sur-reply 6–7. However, the citation to “FIGS. 2-4” of Kwon is merely a typographic error, as Petitioner does not rely on Figure 3 of Kwon to support its arguments. Further, the citation, Ex. 1005, 6:55–7:24, is not new because, in its Petition, Petitioner cited to Ex. 1005, 6:44–7:24 for support. Pet. 13. Moreover, Petitioner’s “partially contain” argument is not an improper new argument, as it is responsive to Patent Owner’s argument that male connectors do not disclose the claimed port units. PO Resp. 16. Petitioner merely clarifies what “contain” means and an ordinarily skilled artisan’s knowledge of a male connector. Under our rules and practice, petitioners are not prohibited from relying on new evidence and arguments in a reply, if the evidence and arguments are responsive to arguments made in a patent owner response. 37 C.F.R. § 42.23(b); PTAB, Consolidated Trial Practice Guide, 73 (Nov. 2019)⁷; *see also Ericsson Inc. v. Intellectual Ventures I LLC*, 901 F.3d 1374, 1379–81 (Fed. Cir. 2018) (holding that the Board abused its discretion where it “pars[ed the party’s] arguments on reply with too fine of a filter”

⁷ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

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and noting that the reply “expands the same argument made in [the] Petition”).

In light of the foregoing, we find that Petitioner has shown that Kwon discloses element 1.1.

c. Elements 1.2 and 1.3 – first data port module

Element 1.2 recites “a first data port module operatively connecting to the first port unit.” Element 1.3 recites, “when a to-be-connected device connects to the first data port module, the first data port module and the main port module form a transmission path enabling data transmission between the to-be-connected device and the end-user device.” As discussed in Section II.A.3 above, we construe element 1.3 to require forming a direct transmission path that does not proceed through the DTCM.

Petitioner argues that, in Kwon, when a peripheral device (to-be-connected device) connects to female connector 275 (first data port module), female connector 275 and male connector 270 (first port unit) on second end module 215 (main port module) form a transmission path between the peripheral device and laptop 600 (end-user device). Pet. 16–18 (citing Ex. 1005, 7:1–8, 7:12–24, Figs. 2, 6).

Patent Owner counters that Kwon in light of Kuo does not disclose element 1.3 because Kwon discloses an indirect transmission path between female connector 275 and male connector 270 through a hub. PO Resp. 17–21, 26–27 (citing Ex. 2018 ¶¶ 142–143). According to Patent Owner, “there is not a 1:1 correlation between female connectors and male

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connectors in [the] end unit 215.” *Id.*; Sur-reply 7–8. Patent Owner also argues that Petitioner’s Reply concedes that (1) “there is not a 1:1 correlation between female connectors and male connectors in end unit 215,” and (2) “there would need to be an intermediate circuit (hub, switch, or splitter).” Sur-reply 7–8.

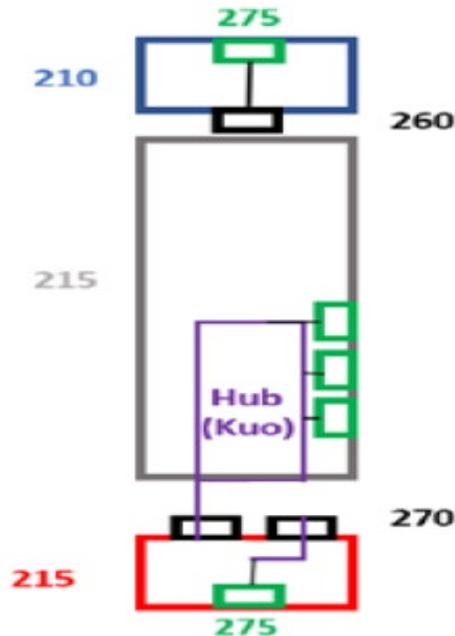
We are persuaded that Petitioner has shown that Kwon teaches elements 1.2 and 1.3. Patent Owner’s arguments and Dr. Baker’s testimony are conclusory, and not supported by Kwon’s disclosure.

Kwon discloses that “[t]here can be a 1:1 correspondence of female electrical connectors 275 to male electrical connectors . . . 270, while in some embodiments multiple female electrical connectors 275 connect to one male electrical connector . . . 270 through hub, switching circuitry, or splitting circuitry.” Ex. 1005, 7:19–24. That sentence includes two teachings. First, it teaches that the direct 1:1 connection applies to second end unit 215 by referring to male connectors 270 of second end unit 215. Second, that sentence teaches that *multiple female* connectors 275 are connected to *one male* connector 270 through a hub, not one female connector to multiple male connectors as Patent Owner alleges. PO Resp. 17–21, 26–27 (citing Ex. 2018 ¶¶ 130–135, 142–143); Sur-reply 7–8.

We also do not agree with Patent Owner that Petitioner concedes that there is no 1:1 correlation and there would need to be an intermediate hub. Sur-reply 7–8. Patent Owner ignores certain portions of Petitioner’s analysis. For example, Petitioner provides a diagram (reproduced below) to rebut Patent Owner’s arguments. Reply 14.

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Petitioner’s diagram above shows that female connector 275 (green) of second end unit (red) is directly connected to one male connector 270 (black), consistent with Kwon’s teaching of a direct 1:1 connection discussed above. Ex. 1005, 7:19–24. Petitioner’s diagram above also shows that *multiple* female connectors (green) in crossbeam (grey) are connected to the other male connector 270 (black) via a hub (purple), consistent with Kwon’s teaching of a multiple-to-one connection discussed above. *Id.*

In light of the foregoing, we find that Petitioner has shown that Kwon discloses elements 1.2 and 1.3.

d. Element 1.4 – DTCM

Element 1.4 requires a DTCM operatively connecting to the second port unit via a first DTP of the DTCM. As discussed in Section II.A.2 above, we construe DTCM as “a component interacting with a larger system

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and having a defined boundary distinct from other modules in the system that electronically transfers information between the end-user device and the to-be-connected device.” We decline to adopt Patent Owner’s construction that requires a “data transmission controller performing in accordance with an industry standard data transmission protocol.”

At the outset, Patent Owner argues that Kuo is not prior art. PO Resp. 21–26; Sur-reply 9–16. Patent Owner also argues that Kwon’s hub is insufficient to disclose the DTCM of element 1.4, and that it “lacks the element of a data transmission control.” PO Resp. 21; Sur-reply 8–9 (citing Ex. 2018 ¶¶ 136–137; Ex. 1003 ¶ 57).

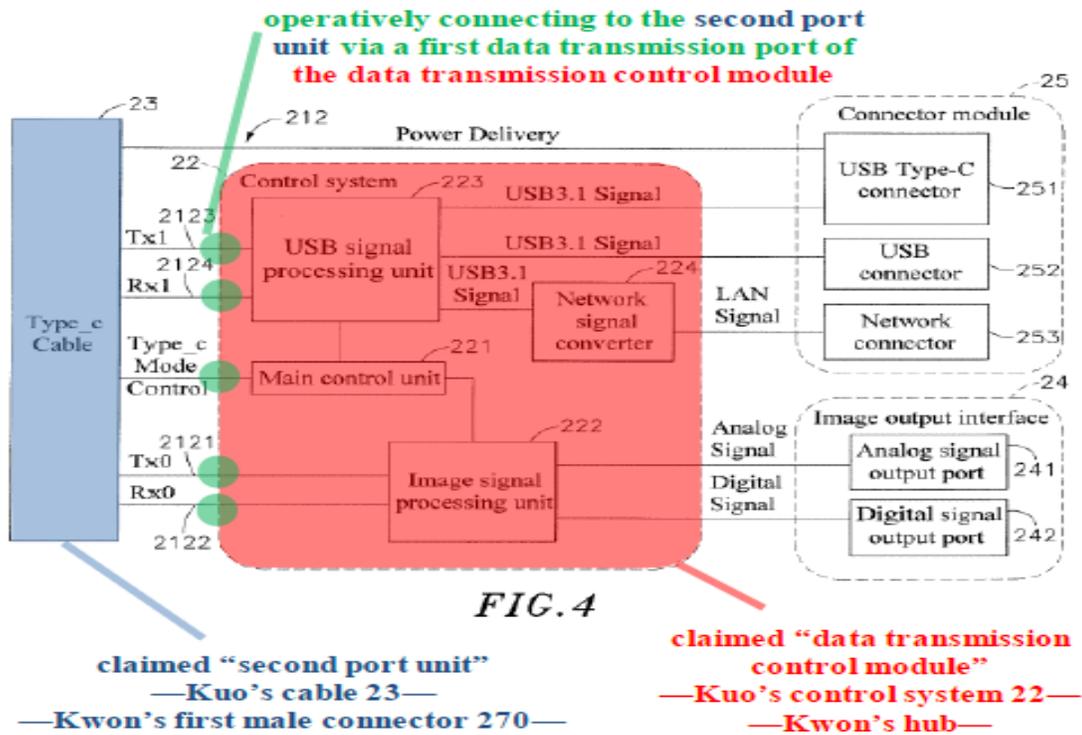
However, as discussed above in Section II.E, we determine that Kuo qualifies as prior art as to the claims at issue. Also, Patent Owner improperly attacks Kwon individually where the ground here is based on Kwon in combination with Kuo. The test for obviousness is whether the references, taken as a whole, would have suggested the claimed subject matter to a person of ordinary skill in the art at the time the invention was made. *See In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986); *In re Keller*, 642 F.2d 413, 426 (CCPA 1981) (noting that one cannot show non-obviousness by attacking references individually where the ground is based on a combination of references).

Kwon in view of Kuo teaches a DTCM

In its Petition, Petitioner explains that, although Kwon’s hub corresponds to the claimed DTCM, Kwon omits specific details about the

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hub. Pet. 20. Petitioner asserts that Kuo discloses a docking station with a hub that extends a USB-C port of a laptop into output interface ports for connecting to peripheral devices. *Id.* (citing Ex. 1006 ¶¶ 23–26, Fig. 1). Petitioner’s annotated Figure 4 of Kuo is reproduced below.



Pet. 23. Annotated Figure 4 of Kuo above shows a circuit block diagram of the electrical module of the docking station. Ex. 1006 ¶ 16. Petitioner asserts that control system 22 (red) controls data transmission between peripheral devices connected to output interface ports 24, 25 and cable 23 (blue) for the host computer. Pet. 23 (citing Ex. 1006 ¶ 21; Ex. 1003 ¶ 59).

Petitioner contends that, when control system 22 is incorporated as Kwon’s hub, Kuo’s cable 23 corresponds to Kwon’s first male connector 270 (second port unit). *Id.* Petitioner also relies on Kuo to show that control

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system 22 is a single chipset, a component having a defined boundary that teaches a DTCM. *Id.* at 21–22. Petitioner further explains that channels 2121–2124 operatively connect cable 23 to control system 22. *Id.* at 23 (citing Ex. 1006 ¶¶ 22, 25). According to Petitioner, any connection of channels 2121–2124 to control system 22 discloses the claimed first DTP, and the hub (DTCM) operatively connects male connector 270 (second port unit) via a first DTP, as required by element 1.4. *Id.* at 23–24. We determine that Petitioner has established sufficiently that Kwon in combination with Kuo discloses element 1.4.

Rationale to combine Kwon with Kuo

Dr. Franzon testifies that an ordinarily skilled artisan would have had a reason to use the functionality of Kuo’s control system 22 in Kwon’s hub so that Kwon’s docking station worked as Kwon intends, connecting multiple female connectors 275 to a single male connector 270. Ex. 1003 ¶¶ 66–73; Pet. 25–30. Dr. Franzon testifies that these aspects were conventional and well-known before the ’429 patent and that a pertinent artisan would have looked to prior art, like Kuo, describing similar docking stations with hubs supporting many-to-one connections between peripheral devices and the host. *Id.* Patent Owner does not dispute Petitioner’s reason to combine the teachings of Kwon and Kuo. We credit Dr. Franzon’s un rebutted testimony as it is consistent with evidence of record.

“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results,”

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as here. *KSR*, 550 U.S. at 416. Notably, Patent Owner admits that “[a]s of the ’429 Patent’s priority date, certain data transmission controls existed in the prior art in the form of commercially available integrated circuits known as hub controllers.” PO Resp. 9. Indeed, Dr. Baker admits that “manufacturers of computers, connectors and peripherals came to market with numerous integrated circuits that implemented the USB 2.0 and 3.1 hubs connecting the host with peripheral devices,” providing known examples in the art, e.g., a single IC, USB Type-C, smart hubs supporting seven ports, Ex. 2028. Ex. 2018 ¶¶ 84–88.

For the foregoing reasons, we determine that Petitioner has articulated a sufficient reason to combine the teachings of Kwon and Kuo.

e. Elements 1.5 and 1.6 – second data port module

Element 1.5 recites “a second data port module operatively connecting to” a second DTP of the DTCM. Element 1.6 recites, when a to-be-connected device connects to the second data port module, the DTCM controls data transmission between the to-be-connected device and the end-user device.

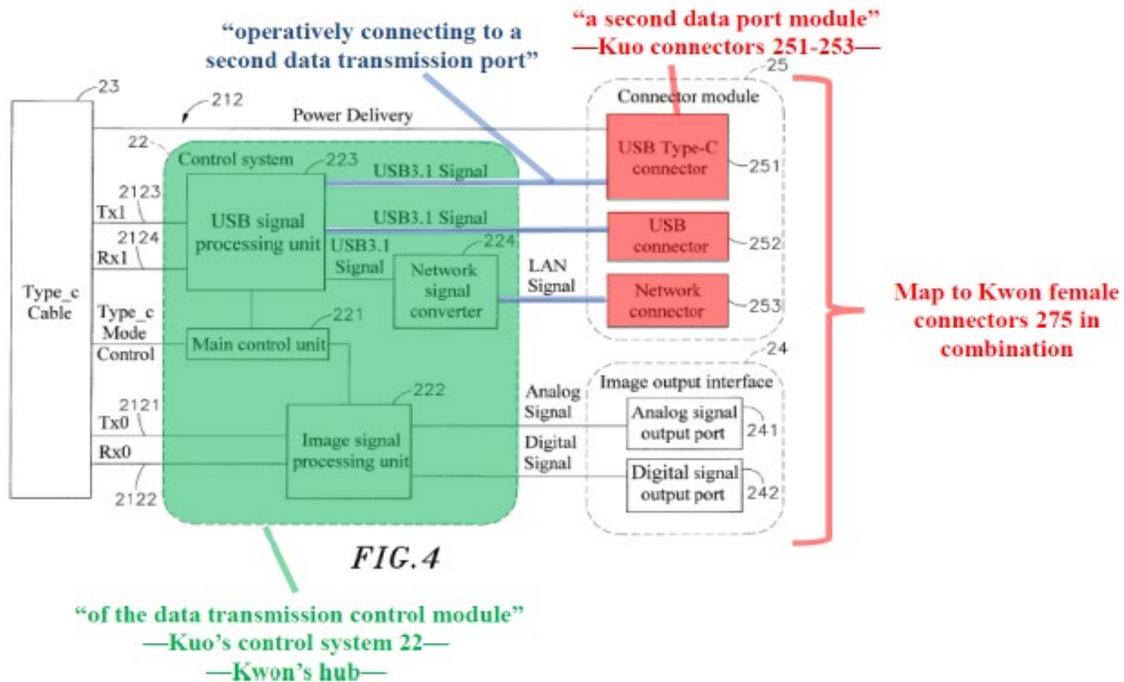
At the outset, Patent Owner argues that Kuo is not prior art as to element 1.5. PO Resp. 21–26; Sur-reply 9–16. Patent Owner also argues that Kwon does not teach the claimed second DTP of the DTCM. PO Resp. 21; Sur-reply 9–16 (citing Ex. 2018 ¶ 138). However, as discussed above in Section II.E, we determine that Kuo qualifies as prior art. Also, Patent

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Owner’s arguments improperly attack Kwon individually. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426.

Petitioner explains that one of Kwon’s nine connectors 275 accounts for the second data port module and that Kuo teaches the DTCM and second DTP. Pet. 30–31 (citing Ex. 1005, 7:1–24, Figs. 2, 6; Ex. 1006, Fig. 4).

Petitioner’s annotated Figure 4 of Kuo is reproduced below. *Id.*



Annotated Figure 4 of Kuo above shows a docking station. Petitioner asserts that Kuo’s connectors 251–253 (red) electrically connect (blue lines) to control system 22 (green) via respective ports of control system 22. *Id.* at 31. Petitioner contends that Kuo discloses that control system 22 has main control unit 221, network signal converter 224, and USB signal processing unit 223, controlling data transmission between connectors

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251–253 and the host computer. *Id.* at 32 (citing Ex. 1006 ¶¶ 21, 25, 26).

Petitioner also explains that, in the combined system, when a peripheral device (to-be-connected device) connects to one of Kwon’s connectors 275, corresponding to Kuo’s connectors 251–253 (second data port module), control system 22 (DTCM) controls data transmission between the peripheral device and the host computer (end-user device). *Id.* at 31–32.

Based on Petitioner’s persuasive contentions and evidence, summarized above, we find that Petitioner has established that Kwon in view of Kuo teaches elements 1.5 and 1.6.

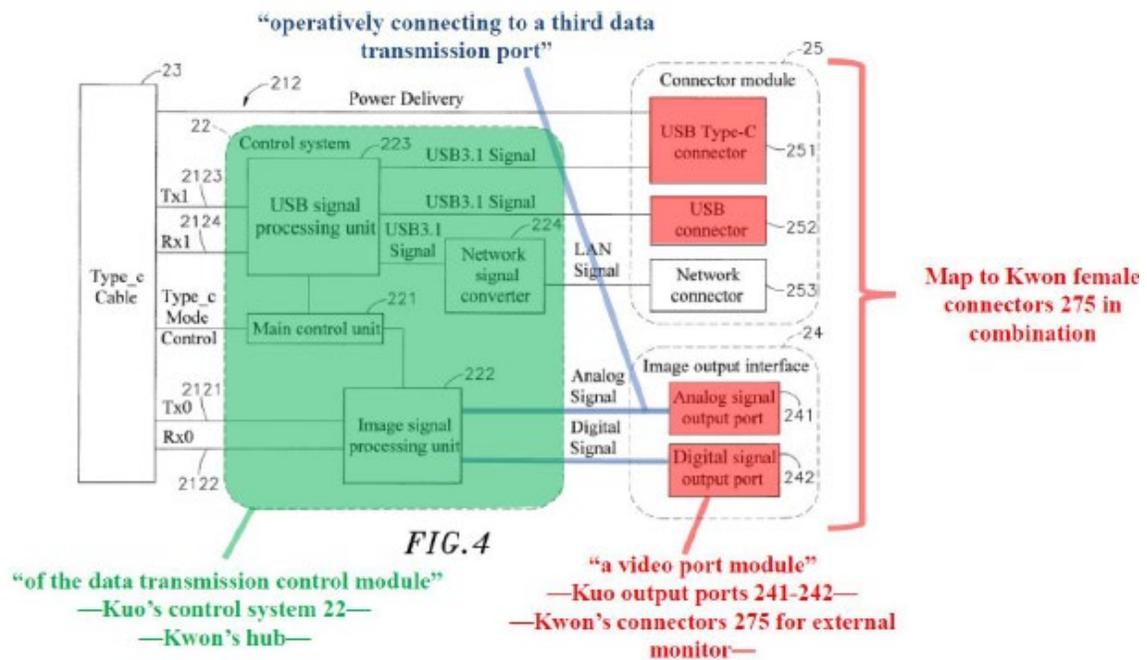
f. Elements 1.7 and 1.8 – video port module

Element 1.7 requires a video port module operatively connecting to a third DTP of the DTCM. Element 1.8 requires, when a to-be-connected device connects to the video port module, the DTCM “receives the to-be-displayed information from the end-user device to the to-be-connected device to display.”

At the outset, Patent Owner argues that Kuo is not prior art. PO Resp. 21–26; Sur-reply 9–16. Patent Owner also argues that Kwon does not teach the claimed third DTP of the DTCM, as recited in element 1.7. PO Resp. 21; Sur-reply 9–16. However, as discussed above in Section II.E, we determine that Kuo qualifies as prior art. Also, Patent Owner’s arguments improperly attack Kwon individually. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426.

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Petitioner explains that Kwon’s female connector 275 for an external display (video port module) connects to male connectors 270 via the hub. Pet. 33–35 (citing Ex. 1005, 7:19–24, 10:34–37 (a VGA output for an external monitor, a mini DisplayPort, a Thunderbolt port)). Petitioner contends that Kuo’s analog port 241 and/or digital port 242 match with Kwon’s monitor connector 275 (video port module). *Id.* at 33. Figure 4 of Kuo is reproduced below with annotations added by Petitioner. *Id.* at 34.



Annotated Figure 4 of Kuo above shows a docking station. Petitioner asserts that Kuo’s video ports 241, 242 (red) (video port module) connect (blue lines) to image signal processing unit 222 of control system 22 (green) (DTCM) via respective ports of control system 22. *Id.* at 34 (citing Ex. 1006 ¶¶ 21, 23). Petitioner contends that main control unit 221 and image signal processing unit 222 receive and process to-be-displayed video information.

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Id. at 35 (citing Ex. 1006 ¶¶ 21, 26). Petitioner asserts that, in the combination, when an external monitor (to-be-connected device) connects to one of Kwon’s monitor connectors 275 corresponding to Kuo’s connectors 241–242 (video port module), control system 22 (DTCM) receives the to-be-displayed information from the host computer (end-user device) to the external monitor to display. *Id.* at 34 (citing Ex. 1003 ¶ 80).

Based on the evidence of record, we find that Petitioner has shown that Kwon in view of Kuo discloses elements 1.7 and 1.8.

g. Objective evidence of non-obviousness

We must consider any evidence of objective indicia of non-obviousness before reaching our conclusion on obviousness. *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328 (Fed. Cir. 2016). Factual inquiries for an obviousness determination include secondary considerations based on evaluation and crediting of objective evidence of non-obviousness. *Graham*, 383 U.S. at 17. Objective evidence may include: long-felt but unsolved needs, failure of others, unexpected results, commercial success, copying, licensing, and praise. *Id.* “For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016) (quotations and citation omitted). “A nexus may not exist where, for example, the merits of the claimed invention were readily available in the prior art.” *Id.* (quotations and citation omitted). Ultimately, “[t]he patentee

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bears the burden of showing that a nexus exists.” *WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999). Here, Patent Owner presents objective evidence of commercial success, industry praise, and copying. PO Resp. 55–72.

Presumption of Nexus

“[A] patentee is entitled to a rebuttable presumption of nexus between the asserted evidence of secondary considerations and a patent claim if the patentee shows that the asserted evidence is tied to a specific product and that the product *is* the invention disclosed and claimed.” *FOX Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quotations and citation omitted). “That is, presuming nexus is appropriate when the patentee shows that the asserted objective evidence is tied to a specific product and that product embodies the claimed features, and is coextensive with them.” *Id.* (quotations and citation omitted).

Here, Patent Owner argues that it is entitled to a presumption of nexus because the Hyperdrive is commensurate with claim 1. PO Resp. 48–55 (citing Ex. 2032; Ex. 2018 ¶ 242; Ex. 2102 ¶¶ 17, 21, 26). Patent Owner submits an annotated photograph of the Hyperdrive to show that it has a main port module of elements 1.1 and 1.3 (reproduced below).

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PO Resp. 51. The annotated photograph above shows the Hyperdrive’s circuit board and housing. Patent Owner argues that “the Hyperdrive features a main port module . . . because Hyperdrive has a substrate . . . which supports miniature electronic components.” *Id.* at 50–51 (citing Ex. 2102 ¶ 26b; Ex. 2032 ¶ 24). Patent Owner avers that “the substrate contains trace paths designed to interact electrically with female port modules and male connectors (as shown [above]), as well as with the computers and peripheral devices connected to the HyperDrive.” *Id.* According to Patent Owner, “[t]he substrate is bounded within the device . . . and is distinct from both the female port modules shown in the red boxes

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[above] and the DTCM),” and “[t]he substrate also contains two male connectors (shown in the yellow box [above]),” which “directly connect to the computer.” *Id.*

In addition, Patent Owner argues that “[t]he substrate is bounded within the device [] and is distinct from” the other modules. Sur-reply 21 (alterations by Patent Owner) (citing Ex. 2032 ¶ 24; Ex. 1043, 42:20–43:8; Ex. 2102 ¶ 26b). According to Patent Owner, “[t]wo male connectors are integrated into the substrate,” forming “an identifiable component used to connect the Hyperdrive to a host computer, and are distinguishable [from] its other modules.” *Id.* Patent Owner also contends that “the block diagram [of the Hyperdrive] does not show the physical relationship of the port units to the shared substrate.” *Id.* at 21–22.

Patent Owner’s arguments are unavailing. Patent Owner’s arguments and the testimony of Mr. Chen and Mr. Liao are conclusory. PO Resp. 50–51; Sur-reply 21–24; Ex. 2032 ¶ 24; Ex. 2102 ¶ 26b; Ex. 1043, 42:20–43:8. As discussed above in Section II.A.1, we clarify that a main port module is a component having a defined and distinct boundary, not merely two port units attached to the substrate of the overall system. The substrate shown above is not a component having a defined and distinct boundary. As Petitioner points out, the Hyperdrive shown above does not have “a component with a defined boundary distinct from other modules in the system that contains a first and second port unit.” Reply 21. Further, “merely annotating a box around the two male ports does not create a main port module containing two port units,” and “the substrate, or circuit board,

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lacks any feature that distinguishes a ‘main port module’ from the rest of the Hyperdrive.” *Id.* at 22–24.

Dr. Franzon testifies that “the yellow box is merely [drawing] an annotation, it is not a ‘defined boundary’ of a main port module,” and that “[m]erely drawing a box around the two male ports of the Hyperdrive does not create a module with a defined boundary.” Ex. 1046 ¶¶ 14–16.

Dr. Franzon also testifies that a pertinent artisan “could not look at the substrate in the photo above and determine where a main port module begins and ends because the substrate lacks any feature that distinguishes a ‘main port module’ from the rest of the device.” *Id.* ¶ 14. We credit

Dr. Franzon’s testimony as it is consistent with the other evidence of record. Neither the photograph above nor the Hyperdrive’s block diagram (Ex. 1037) shows a main port module, much less a main port module containing the first and second port units. In contrast, Figure 2 of the ’429 patent shows a main port module including first and second port units, having a defined boundary distinct from other modules and the boundary of the overall port extension system. Ex. 1001, 3:5–6:32, Figs. 1, 2. Nothing in the ’429 patent indicates that a main port module is merely the substrate of the overall system. *Id.*

In light of the foregoing, we find that Patent Owner fails to show that the Hyperdrive has a main port module, as required by elements 1.1 and 1.3. As such, Patent Owner has not shown that the Hyperdrive is the invention claimed in the ’429 patent. We determine that Patent Owner is not entitled

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to a rebuttable presumption of nexus between the asserted evidence of secondary considerations and the claims of the '429 patent.

“[T]he patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the direct result of the unique characteristics of the claimed invention.” *FOX Factory*, 944 F.3d at 1373–74 (quotations and citation omitted). Patent Owner retains the burden of proving the degree to which its objective evidence tied to a product is attributable to a particular claimed invention. *Id.* at 1378.

Commercial Success

In its Response, Patent Owner argues that the Hyperdrive is commercially successful, relying on testimony of Mr. Dan Cenatempo and Dr. Baker for support. PO Resp. 68–72 (citing Ex. 2100 ¶¶ 51–63; Ex. 2075 (Hyper 28 Series Hub Sales); Ex. 2018 ¶¶ 269–270. Patent Owner provides the following evidence: (1) Hyperdrive’s gross sales; (2) a comparison between Hyperdrive’s sales and the sales of Patent Owner’s Predecessor Hubs; (3) a comparison of Patent Owner’s hub sales growth (attributable to the Hyperdrive) to the growth in the computer peripheral market, Apple computer sales, laptop computer sales, and Apple laptop computer sales; and (4) the relative success of the Hyperdrive Kickstarter funding to other Kickstarter projects. *Id.*

In its Reply, Petitioner counters that Patent Owner has not attributed the evidence of commercial success to the claims of the '429 patent. Reply 28. Petitioner contends that Patent Owner does not establish that the

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Hyperdrive’s alleged commercial success is tied to any element of the ’429 patent. *Id.* Petitioner also avers that “[w]hile Sanho compares the Hyperdrive’s commercial performance to predecessor hubs or the market generally, it fails to establish that other products do not include ’429 Patent claim elements such as a main port module or a DTCM.” *Id.*

In its Sur-reply, Patent Owner avers that “[b]y showing that the Hyperdrive embodies claim 1 of the ’429 Patent, Patent Owner is entitled to a presumption of nexus.” Sur-reply 25. Patent Owner also argues that “[w]here, as here, the claim is a combination of prior art elements, the patent owner is entitled to show that it is the claimed combination as a whole that serves as a nexus,” and that “proof of nexus is not limited to only when objective evidence is tied to the supposedly ‘new’ feature(s).” *Id.* (citing *Rambus Inc. v. Rea*, 731 F.3d 1248, 1258 (Fed. Cir. 2013)).

Patent Owner’s arguments are unavailing. “[T]he record must show a sufficient nexus between [the] commercial success and the patented invention.” *Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573, 1579 (Fed. Cir. 1997). “A *prima facie* case of nexus is generally made out when the patentee shows both that there is commercial success, and that the thing (product or method) that is commercially successful is the invention disclosed and claimed in the patent.” *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1394 (Fed. Cir. 1988).

As discussed above, we find that Patent Owner is not entitled to a presumption of nexus. The Hyperdrive does not embody any challenged

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claim because the Hyperdrive does not have a main port module, as required by elements 1.1 and 1.3.

In addition, the record reflects that Patent Owner’s objective evidence was due to extraneous factors other than the claimed subject matter or the claimed combination as a whole. As discussed below in our industry praise analysis, the evidence of record shows that the Hyperdrive’s alleged success was due to the reputation of the company based on other products, unclaimed features (e.g., the external design), and conventional features known in the art (e.g., previously known ports and smart hubs). *See, e.g.*, Ex. 2042, 1 (“The best part of this new accessory is that it’s made by a company with years of experience in manufacturing external batteries for MacBook units and dongles for the 12-inch MacBook.”); Ex. 2043, 3 (“[T]he Hyperdrive is pretty small and neat, with dimensions of 115 x 28.5 x 8.5mm and weighing 34g (it’s fashioned from aluminum)”); Ex. 2040, 1 (The Hyperdrive “restores virtually all of the ports found on the previous MacBook Pro from 2015.”); Ex. 2028 (disclosing a smart hub that was already available in the market, supporting seven ports and offering “simpler designs and cost savings” as well as faster “data rates in a single integrated circuit.”).

As the Federal Circuit has held, “[the] success is relevant in the obviousness context only if there is proof that the sales were a direct result of the unique characteristics of the claimed invention – as opposed to other economic and commercial factors unrelated to the quality of the patented subject matter.” *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996). “[I]f the

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feature that creates the commercial success was known in the prior art, the success is not pertinent.” *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006) (holding that evidence that commercial success was due to unclaimed or non-novel features of a device “clearly rebuts the presumption that [the product’s] success was due to the claimed and novel features”).

Further, we are not persuaded by Patent Owner’s argument that “the patent owner is entitled to show that it is the claimed combination as a whole that serves as a nexus,” and that “proof of nexus is not limited to only when objective evidence is tied to the supposedly ‘new’ feature(s).” Sur-reply 25 (citing *Rambus*, 731 F.3d at 1258). Here, unlike *Rambus*, Patent Owner fails to show that its objective evidence pertains to the claimed combination as a whole. As discussed above, the Hyperdrive does not include a critical claimed feature—namely, a main port module as recited in elements 1.1 and 1.3, which require “*a main port module for connecting to an end-user device . . . having first and second port units*” and “*the first data port module and the main port module form a transmission path enabling data transmission between the to-be-connected device and the end-user device.*” Ex. 1001, 6:48–65 (emphases added). During the prosecution of the ’429 patent, Applicant differentiated the claims from the prior art by arguing that a prior art system applied in a rejection does not have a main port module. Ex. 1002, 66–67, 75. The ’429 patent discloses that “[i]n *all embodiments*, when the to-be-connected device 110 connects to the first data port module 20, *data directly transmits* between the first data port module 20 and the

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end-user device 120 *via main port module 10.*” Ex. 1001, 3:39–42

(emphases added). In short, the Hyperdrive does not implement the overall system architecture disclosed or claimed in the ’429 patent.

Moreover, Patent Owner’s objective evidence does not show adequately that Hyperdrive’s sales constitute commercial success when considered in relation to overall market share. PO Resp. 68–72 (citing Ex. 2100 ¶¶ 51–63; Ex. 2075; Ex. 2018 ¶¶ 269–270). Patent Owner does not provide any data pertaining to overall market share, and there is no indication that Hyperdrive’s sales numbers or sales growth represent a substantial quantity in the overall market share. *Id.* Indeed, Mr. Cenatempo, Patent Owner’s declarant who was retained to evaluate the commercial success of the Hyperdrive, admits that he “looked for, but did not find, information on the size of the total market or market shares for Apple laptop compatible adapter hubs.” Ex. 2100 ¶¶ 1, 51. Mr. Cenatempo testifies that his “review indicates that the HyperDrive has had financial success within the context of the broader market as measured by both its sales and initial Kickstarter campaign.” *Id.* ¶ 53. However, Mr. Cenatempo does not explain how Hyperdrive’s sales numbers or sales growth captured a substantial share of the marketplace or that the alleged commercial success is a direct result of the unique characteristics of the claimed invention or the claimed combination as a whole. Dr. Baker testifies that he is relying on Mr. Cenatempo’s opinions and analysis for the matter concerning commercial success. Ex. 2018 ¶¶ 269–270. The Federal Circuit has held that an expert declaration that merely repeats, in conclusory fashion, that the

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success of the product is due to the claimed invention is insufficient to establish a nexus. *In re Cree, Inc.*, 818 F.3d 694, 703–04 (Fed. Cir. 2016).

We recognize that “market share data, though potentially useful, is not required to show commercial success.” *Chemours Co. FC, LLC v. Daikin Indus., Ltd.*, 4 F.4th 1370, 1378 (Fed. Cir. 2021). Nevertheless, the Federal Circuit has explained that “sales figures coupled with market data provide stronger evidence of commercial success” than sales figures alone. *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360–61 (Fed. Cir. 1999). More importantly, even if Patent Owner’s objective evidence was sufficient to show that the Hyperdrive was commercially successful, as discussed above, the Hyperdrive is not the invention disclosed or claimed in the ’429 patent. Patent Owner does not show that the alleged commercial success is a direct result of the unique characteristics of the claimed invention or the claimed combination as a whole.

In light of the foregoing, Patent Owner fails to establish sufficiently a nexus between the objective evidence of commercial success and the merits of the claimed invention. In the absence of an established nexus with the claimed invention, objective evidence is entitled to little weight, and generally has no bearing on the legal issue of obviousness. *See In re Vamco Machine & Tool, Inc.*, 752 F.2d 1564, 1577 (Fed. Cir. 1985). Accordingly, Patent Owner’s evidence concerning commercial success is accorded little weight.

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Industry Praise

Patent Owner argues that “[t]he tech press praised the Hyperdrive,” citing articles regarding the Hyperdrive and testimony of Mr. Cenatempo and Dr. Baker for support. PO Resp. 63–68 (citing Exs. 2040–2050; Ex. 2100 ¶¶ 20–42; Ex. 2018 ¶¶ 258–268). Petitioner counters that there is no nexus between the claims and Hyperdrive’s industry praise because the ’429 patent claims a specific configuration of a hub, and there is no evidence that the Hyperdrive’s industry praise is tied to the ’429 patent’s modular configuration. Reply 28–29. In its Sur-reply, Patent Owner argues that “[o]nly the Hyperdrive, the embodiment of the 429 Patent, was the recipient of substantial industry praise.” Sur-reply 26.

Patent Owner’s arguments are unavailing. Patent Owner admits that the claim here “is a combination of prior art elements.” Sur-reply 25. As discussed above, the Hyperdrive does not embody any of the challenged claims because the Hyperdrive does not have a main port module, as required by elements 1.1 and 1.3. Therefore, the Hyperdrive does not implement the overall system architecture claimed in the ’429 patent.

In addition, the testimony of Mr. Cenatempo and Dr. Baker is conclusory. Ex. 2100 ¶¶ 20–42; Ex. 2018 ¶¶ 258–268. The articles (Exs. 2040–2050) relied upon by them do not show that the industry praise is the direct result of the unique characteristics of the claimed subject matter or the claimed combination as a whole. Notably, some of the articles praise the company, not the result of the unique characteristics of the claimed subject matter. For example, the Techtimes article states that “[t]he best part

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of this new accessory is that it’s made by a company with years of experience in manufacturing external batteries for MacBook units and dongles for the 12-inch MacBook.” Ex. 2042, 1; Ex. 2047, 3; Ex. 2050, 2.

The rest of the evidence mainly focuses on unclaimed features and features known in the art. *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1333 (Fed. Cir. 2019) (“[T]he identified objective indicia must be directed to what was not known in the prior art.” (quotations and citations omitted)); *ClassCo*, 838 F.3d at 1220. Mr. Cenatempo testifies that he reviewed the articles and found “significant industry praise for the HyperDrive, such as”:

- It solves the dongle problem and port problem of the 2016 Gen MacBook Pro;
- The HyperDrive adds back the ports Apple removed from the 2016 Gen MacBook Pro;
- It adds a variety of full speed ports;
- The Hyperdrive is small, neat, sits flush against the 2016 Gen MacBook Pro, and fits the laptop’s design / aesthetic;
- The Hyperdrive supports connecting dual monitors to the 2016 Gen MacBook Pro;
- It is cost effective; and
- The Hyperdrive eliminates the cost, mess, and inconvenience of multiple dongles.

Ex. 2100 ¶ 20. Dr. Baker provides a similar summary. Ex. 2018

¶¶ 258–268. However, neither Mr. Cenatempo nor Dr. Baker explains that the alleged industry praise is the direct result of the unique characteristics of the claimed subject matter or the claimed combination as a whole. Rather, those alleged praises are related to unclaimed features or conventional

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features known in the art. Notably, none of the claims recites speed, dimensions, weights, color, external design, or cost. U.S. Design Patent No. D855,616 S covers the exterior design of the Hyperdrive. Ex. 2103 ¶¶ 4, 7–8. The claims also do not recite ports for connecting dual monitors.

Dr. Baker admits that IC smart hubs and hub controllers were known in the art, including a “Seven-Port USB 3.1 Gen1 SmartHub IC for USB Type-C” that was “available in the market” offering “simpler designs and cost savings” and “enabling 5 Gbps USB data rates in a single integrated circuit” (Ex. 2028). Ex. 2018 ¶¶ 84–88 (citing Exs. 2024–2029), *cited in* PO Resp. 9. Further, designing a system for providing additional ports to interface directly with a specific MacBook was known in the art. Ex. 1007, 3:1–5 (disclosing a connectors device to match a MacBook); Ex. 1003 ¶ 132. Patent Owner admits that “O’Shea teaches a docking station that arranges ports to match a given computer.” PO Resp. 39. Moreover, adding back ports that were previously available on an older MacBook amounts to using ports known in the art. It also was known in the art to design a system having a direct 1:1 connection and multiple-to-one connection via a hub. Ex. 1007, 2:57–67, Fig. 1 (one output port connecting to one input port directly, while multiple output ports connecting to one input port via a hub); Ex. 1005, 7:1–24, Figs. 2, 6 (a direct 1:1 connection between one female port and one male port, while multiple female ports are connected to one male port via a hub).

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In short, Patent Owner’s objective evidence does not show that the industry praise is the direct result of the unique characteristics of the claimed subject matter or the claimed combination as a whole.

For the foregoing reasons, we find that Patent Owner fails to show a nexus between the objective evidence of industry praise and the merits of the claimed invention. In the absence of an established nexus with the claimed invention, objective evidence is entitled to little weight, and generally has no bearing on the legal issue of obviousness. *See Vamco*, 752 F.2d at 1564. Accordingly, Patent Owner’s objective evidence is accorded little weight.

Copying

Evidence of copying “requires duplication of features of the patentee’s work based on access to that work, lest all infringement be mistakenly treated as copying.” *Liqwd, Inc. v. L’Oreal USA, Inc.*, 941 F.3d 1133, 1137 (Fed. Cir. 2019) (quotations and citation omitted). “[A]s with the commercial success analysis, a nexus between the copying and the novel aspects of the claimed invention must exist for evidence of copying to be given significant weight in an obviousness analysis.” *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012). Here, Patent Owner argues that Petitioner copied the Hyperdrive with the Ultradrive and that there are eighteen other examples of copying by other companies, relying on testimony of Mr. Cenatempo, Mr. Chen, and Dr. Baker for support. PO Resp. 56–61 (citing Ex. 2100 ¶¶ 43–50; Ex. 2018

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¶¶ 243–247; Ex. 2015 ¶¶ 2–4; Ex. 2032 ¶¶ 9–10, 33–43; Ex. 2051 ¶¶ 2, 6; Exs. 2016, 2033, 2035–2039, 2040, 2045–2047, 2049, 2069).

Petitioner counters that there is no evidence on whether the Ultradrive practices the novel aspects of the claimed invention. Reply 29–31 (citing Ex. 1042, 55:17–59:4; Ex. 1043, 68:20–70:20). According to Petitioner, Patent Owner does not show that the Ultradrive has a main port module and fails to identify a DTCM in the Ultradrive or the connections between the DTCM and the second port unit, second port module, and video port module to determine that they are operatively connected. *Id.* (citing Exs. 2032, 2018; Ex. 1046 ¶ 27). Petitioner also avers that Patent Owner fails to show that Petitioner had access to the internal layout of the ’429 patent before designing the Ultradrive, or that other examples of copying had access to the ’429 patent claimed layout. *Id.* (citing Ex. 2100; Ex. 1042, 60:2–61:8).

In its Sur-reply, Patent Owner argues that Petitioner copied the Hyperdrive, and that this copying extended to “a key aspect of the Hyperdrive’s internal architecture as set forth in claim 1, namely having one female data port module directly connected to a first male connector, while all other female ports [are] indirectly connect[ed] to a second male connector through a DTCM, such as [a] modern USB hub.” Sur-reply 26–27.

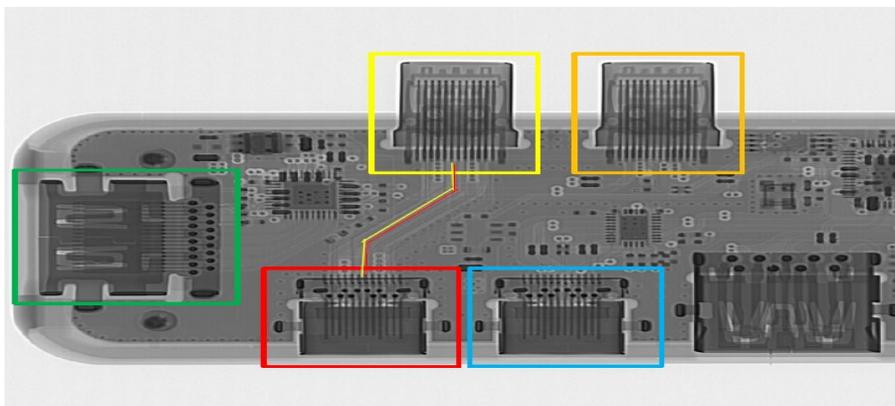
However, Patent Owner fails to show that the Ultradrive or the other products practice any alleged novel aspects of the claimed invention or the claimed combination as a whole. We disagree with Patent Owner’s assertion that “a key aspect of the Hyperdrive’s internal architecture as set forth in claim 1 [is] having one female data port module directly connected

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to a first male connector, while all other female ports [are] indirectly connect[ed] to a second male connector through a DTCM, such as [a] modern USB hub.” Sur-reply 26–27. Patent Owner mischaracterizes the claimed subject matter by eliminating a critical claimed feature—namely, a main port module as recited in elements 1.1 and 1.3, which require “*a main port module for connecting to an end-user device . . . having first and second port units*” and “*the first data port module and the main port module form a transmission path enabling data transmission between the to-be-connected device and the end-user device.*” Ex. 1001, 6:48–65 (emphases added). As discussed above, the Hyperdrive does not include a main port module as recited in elements 1.1 and 1.3. Thus, the Hyperdrive does not implement the internal architecture claimed in the ’429 patent.

In addition, Patent Owner fails to show that the Ultradrive or any of the other products has a main port module, a DTCM, or the transmission paths of the port units to the chipsets. Patent Owner and its declarants rely on an x-ray of the Ultradrive (reproduced below with annotations added by Mr. Chen). Ex. 2032 ¶ 43.



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Annotated x-ray of the Ultradrive above shows, according to Mr. Chen, a direct path connecting the first data port module (red) to the first male connector, while intermediate (hub) circuitry is used to facilitate an indirect connection between the video port module (green) and the second male connector (orange). Ex. 2032 ¶ 43.

Neither Patent Owner nor any of its declarants, however, identifies where the Ultradrive or any of the other products has a main port module, a DTCM, or the transmission paths of the port units to the chipsets. PO Resp. 56–61; Ex. 2100 ¶¶ 43–50; Ex. 2018 ¶¶ 243–247; Ex. 2032 ¶¶ 9–10, 33–43. During cross-examination, Mr. Chen admitted that his declaration does not show the trace paths between the various female port modules and the DTCM on the Ultradrive. Ex. 1043, 68:20–70:20 (admitting that “the image isn’t clear enough to show” the trace paths between the female port modules and DTCM). Dr. Baker also admitted that he did not “walk through each and every element of claim 1 and show how it is met by the UltraDrive product,” and that Mr. Chen’s Declaration did not identify a DTCM in the Ultradrive. Ex. 1042, 55:17–59:4. Dr. Baker further admitted that, for any of the other products, neither his Declaration nor Mr. Chen’s Declaration provides “an element-by-element analysis of claim 1 showing how that product embodies claim 1.” *Id.* at 60:2–61:8. Hence, Patent Owner fails to show that the Ultradrive or the other products practice any alleged novel aspects of the claimed invention or the claimed combination as a whole.

For the foregoing reasons, we find that Patent Owner fails to show a nexus between the objective evidence of copying and the merits of the

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claimed invention. In the absence of an established nexus with the claimed invention, objective evidence is entitled to little weight, and generally has no bearing on the legal issue of obviousness. *See Vamco*, 752 F.2d at 1564. Accordingly, Patent Owner’s objective evidence is accorded little weight.

Conclusion on objective evidence of non-obviousness

We have weighed Patent Owner’s objective evidence of non-obviousness against the evidence of obviousness in the entire record. We conclude that, on balance, the strong evidence of obviousness outweighs the weak evidence of non-obviousness. *See Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (holding that the objective considerations of non-obviousness presented, including substantial evidence of commercial success, praise, and long-felt need, were inadequate to overcome a strong showing of primary considerations that rendered the claims at issue invalid).

h. Conclusion on Claim 1

We conclude that Petitioner has shown by a preponderance of the evidence that claim 1 would have been obvious over Kwon in view of Kuo.

2. Claims 2–6 and 13–17

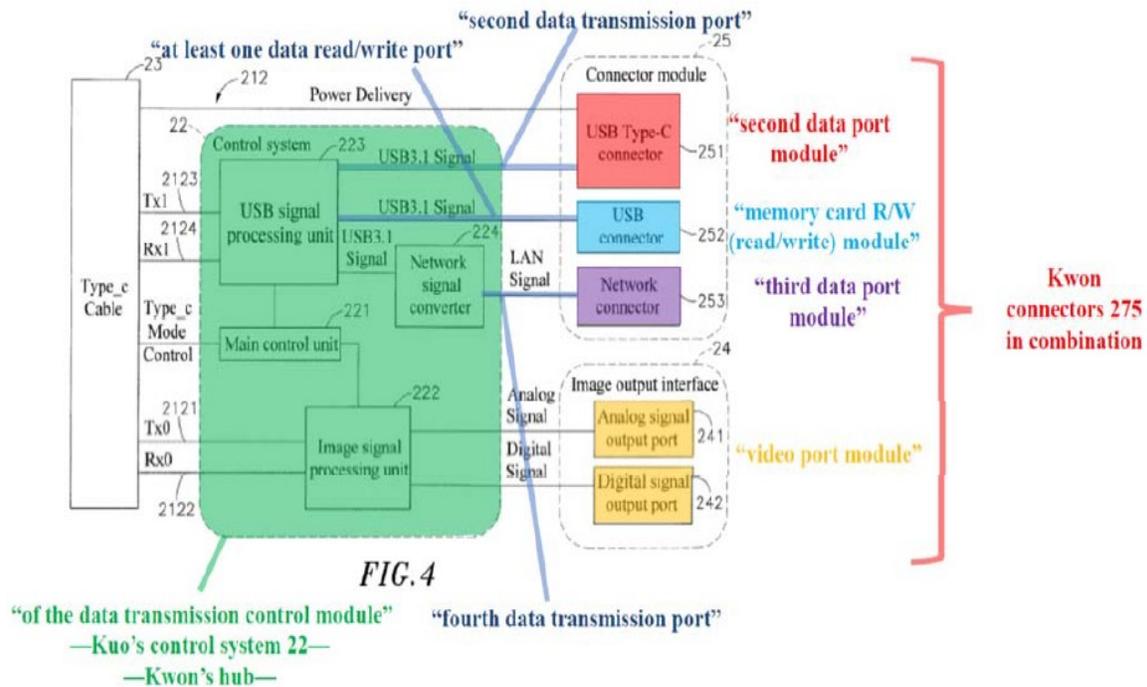
Petitioner asserts that Kwon in view of Kuo teaches the limitations recited in claims 2–6 and 13–17. Pet. 36–50. Based on the evidence of record, we are persuaded by Petitioner’s showing.

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a. Claims 2 and 3

Claim 2 requires a third data port module operatively connecting to a fourth DTP of the DTCM and a memory card module operatively connecting to a data read/write port of the DTCM. Claim 3 requires the to-be-connected device to comprise a memory card, which connects to the end-user device via the memory card module and the DTCM.

Petitioner’s annotated Figure 4 of Kuo is reproduced below. Pet. 36.



As shown in annotated Figure 4 of Kuo above, the system includes a third data module (connector 253) (purple) operatively connecting to a fourth DTP (third dark blue line) of the DTCM (control system 22) (green), as well as a memory card module (light blue) operatively connecting to a data read/write port (second dark blue line). *Id.*

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Petitioner asserts that Kwon discloses “a port to receive a flash memory card (e.g., SD Card, Memory stick or xD card).” *Id.* at 37 (quoting Ex. 1005, 10:37–39). Dr. Franzon testifies that a pertinent artisan would have implemented a memory card reader, as taught in Kwon, because the docking station would be more useful. Ex. 1003 ¶¶ 83, 84.

Patent Owner counters that the combination lacks “a third data port module operatively connecting to *a fourth data transmission port*,” as required by claim 2, and that claim 3 would not have been obvious because it depends from claim 2. PO Resp. 45–46 (citing Ex. 2018 ¶¶ 210, 217).

Patent Owner’s argument is unavailing. As shown in annotated Figure 4 of Kuo above, the system includes a third data port module (connector 253) (purple) connecting to a fourth DTP (third dark blue line) of the DTCM (green). Pet. 36. Based on the evidence of record, we find that Petitioner has shown that Kwon in view of Kuo teaches claims 2 and 3 and has articulated a reason to combine the teachings of Kwon and Kuo.

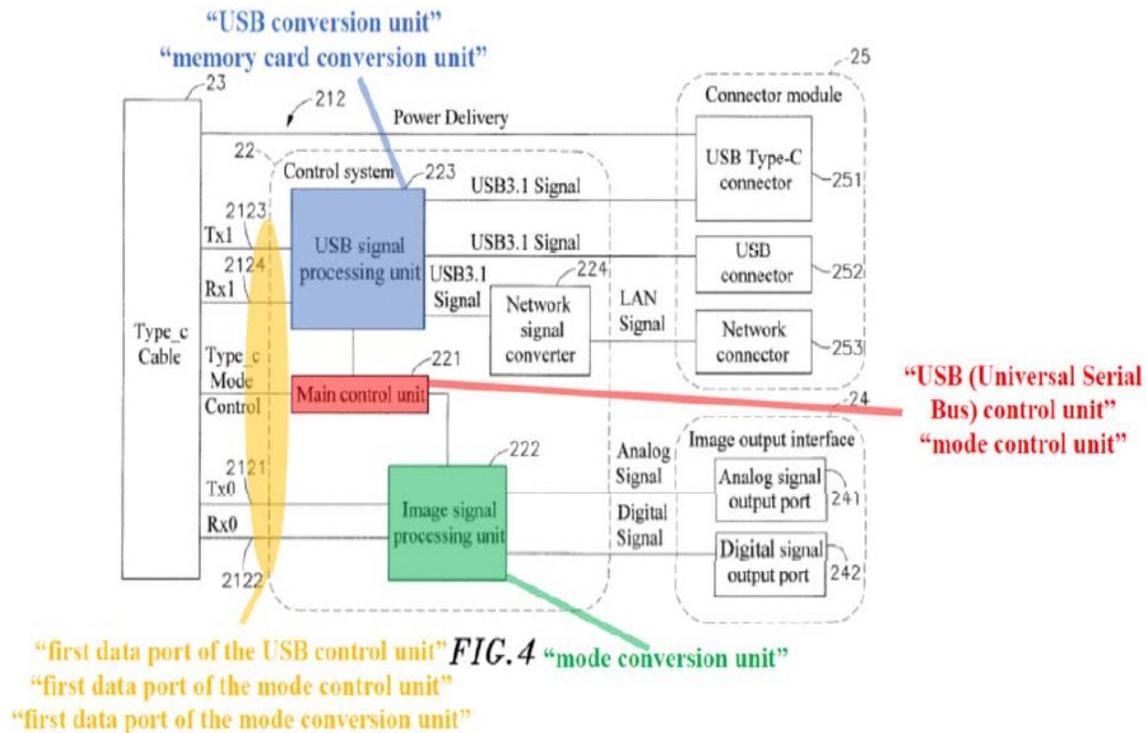
b. Claims 4–6

Claim 4 requires the DTCM to comprise a USB control unit, a USB conversion unit, a memory card conversion unit, a mode control unit, and a mode conversion unit. Claim 5 requires the first DTP of the DTCM to comprise a first data port of the USB control unit, a first data port of the mode control unit, and a first data port of the mode conversion unit. Claim 6 requires the second DTP of the DTCM to be a second data port of the USB control unit.

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Petitioner’s annotated Figure 4 of Kuo is reproduced below.



Annotated Figure 4 of Kuo above shows control system 22 comprises: main control unit 221 (red) (USB control unit and mode control unit), USB signal processing unit 223 (blue) (USB conversion unit and memory card conversion unit), and image signal processing unit 222 (green) (a mode conversion unit). Pet. 39–43.

For claim 4, Petitioner asserts that Kuo’s main control unit 221 teaches a USB control unit and a mode control unit because it controls data transmission between a connected peripheral device and the host computer and performs USB Type-C control to cause image signal processing unit 22 to convert image information into the proper format for display. *Id.* at 39–42 (citing Ex. 1006 ¶¶ 21, 24, 26; Ex. 1003 ¶¶ 87, 91). Petitioner also

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contends that Kuo’s USB signal processing unit 223 discloses a USB conversion unit because it converts between USB 3.1 and other USB protocols. *Id.* at 40–41 (citing Ex. 1006 ¶¶ 6, 21, 25, 26; Ex. 1003 ¶¶ 88–89). Petitioner avers that Kwon in view of Kuo suggests a memory card conversion unit because a pertinent artisan would have modified Kuo’s control system 22 for accommodating Kwon’s memory card reader for reading/writing to memory cards by either modifying USB signal processing unit 223 or adding a separate unit. *Id.* at 41 (citing Ex. 1003 ¶ 90). Petitioner further submits that Kuo’s image signal processing unit 222 discloses a mode conversion unit. *Id.* at 41–42 (citing Ex. 1006 ¶¶ 21, 26).

For claim 5, Petitioner asserts that the channels (orange) in the annotated Figure 4 of Kuo above correspond to the first DTP of the DTCM because they connect to main control unit 221 and image signal processing unit 222. *Id.* at 42–43 (citing Ex. 1006 ¶¶ 22, 25; Ex. 1003 ¶ 92).

For claim 6, Petitioner asserts that the connection of control system 22 to USB-C connector 251 in Kuo corresponds to the claimed second DTP. *Id.* at 43–45. Petitioner also asserts that a relevant artisan would have been motivated to implement Kuo’s USB signal processing unit 223 and main control unit 221 as a single unit having the functionality of both units, so main control unit 221 could convert the data itself, reducing the number of components (e.g., computer chips) needed to make the docking station, cost, and size of the docking station. *Id.* (citing Ex. 1003 ¶¶ 93–96).

Patent Owner counters that “there is no teaching in Kwon of the additional elements of Claim 4,” and that claims 5 and 6 would not have

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been obvious because they depend from claim 4. PO Resp. 46 (citing Ex. 2018 ¶ 215). However, Patent Owner’s argument improperly attacks Kwon individually, when Petitioner’s argument for claim 4 is premised on the combined teachings of Kwon and Kuo. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426.

Based on Petitioner’s persuasive contentions and evidence, summarized above, we determine that Petitioner has shown that Kwon in view of Kuo teaches claims 4–6 and has articulated a reason to combine the teachings of Kwon and Kuo.

c. Claims 13–17

Petitioner asserts that Kwon in light of Kuo would have rendered claims 13–17 obvious. Pet. 46–50. Petitioner asserts that Kwon in view of Kuo discloses a video port module comprising a VGA port, as required by claim 13. Pet. 46 (citing Ex. 1005, 10:34–37; Ex. 1006 ¶ 23). Petitioner contends that Kwon in view of Kuo teaches the first data port module comprising a USB Type-C connector, as required by claim 14. *Id.* at 46–47 (citing Ex. 1005, 10:34–29, Figs. 2, 6; Ex. 1006, Figs. 1, 2). Petitioner argues that Kwon in view of Kuo teaches the second data port module comprising a USB female port, as required by claim 15. *Id.* at 48 (citing Ex. 1005, 10:34–39, Figs. 2, 6; Ex. 1006 ¶¶ 6, 21–26, Figs. 1, 2; Ex. 1003 ¶ 99; Ex. 1009; Ex. 1031 ¶ 48). Petitioner avers that Kwon in view of Kuo suggests the third data port module comprising a Type-C female port, as required by claim 16. *Id.* at 48–49 (citing Ex. 1005, Figs. 2, 6; Ex. 1006 ¶ 6;

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Ex. 1010, 1–2; Ex. 1009, 1–3; Ex. 1003 ¶ 102). Petitioner asserts that Kwon in view of Kuo suggests the first port unit comprising a USB male port, as required by claim 17. *Id.* at 49–50 (citing Ex. 1005, 6:14–20, 6:44–7:24, Fig. 2; Ex. 1006 ¶ 21, Figs. 1–3; Ex. 1003 ¶ 103; Exs. 1026–1029).

Patent Owner counters that claims 13–17 depended from claim 2 would not have been obvious because Kwon in view of Kuo lacks the elements of claim 2. PO Resp. 45–46 (citing Ex. 2018 ¶¶ 210, 217). However, as discussed above, Kwon in view of Kuo teaches the elements of claim 2. Based on Petitioner’s persuasive contentions and evidence, summarized above, we find that Petitioner has shown that Kwon in view of Kuo teaches or suggests the limitations of claims 13–17.

d. Objective evidence of non-obviousness

Patent Owner relies upon the same arguments and objective evidence for claim 1. PO Resp. 48–72. For the same reasons discussed above in Section II.F.1.g, we find that the objective evidence is accorded little weight here. We conclude that, on balance, the strong evidence of obviousness based on Kwon and Kuo outweighs the weak objective evidence of non-obviousness. *See Leapfrog*, 485 F.3d at 1162.

For the foregoing reasons, we conclude that Petitioner has established by a preponderance of the evidence that claims 2–6 and 13–17 are unpatentable under § 103 as obvious over Kwon and Kuo.

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3. Conclusion on Obviousness based on Kwon and Kuo

For the foregoing reasons, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over Kwon and Kuo.

G. Ground 2 – Obviousness Over Kwon, Kuo, and Chang

Petitioner asserts that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over Kwon, Kuo, and Chang (Ground 2). Pet. 50–55. For the reasons provided below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over Kwon, Kuo, and Chang.

As discussed above regarding Ground 1, Petitioner has shown that Kwon in view of Kuo teaches or suggests all of the limitations in the challenged claims and has articulated reasons to combine the teachings of Kwon and Kuo.

In addition, Petitioner explains that, to the extent that the prior art in Ground 1 does not teach or suggest the claimed “main port module,” the combination of Kwon, Kuo, and Chang would have rendered this element obvious. Pet. 50. In particular, Petitioner asserts that Chang discloses a multi-interface connector with an internal circuit board providing side-by-side a USB, a DisplayPort, and a HDMI port. *Id.* at 50–52 (citing Ex. 1008 ¶¶ 26–32, 34–37, Figs. 5–10). Petitioner contends that Chang’s circuit board is a self-contained component, separate from other modules, that contains first and second port units. *Id.* Petitioner asserts that a relevant

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artisan would have been motivated “to use a separate, dedicated circuit board like Chang’s to host the connection terminals of Kwon’s male connectors 270 and couple them to the underlying circuit board as Chang discloses” because “using Chang’s circuit board in Kwon would improve the durability and alignment of Kwon’s male connectors 270.” *Id.* at 52–55 (citing Ex. 1008 ¶¶ 6–8, 27–28, 32, 34–35, 37, Figs. 5–10; Ex. 1003 ¶¶ 107–109, 111–113). According to Petitioner, “respective tongue portions 22-24 of Chang’s circuit board 2 could serve as the substrates for the connectors 270” of Kwon, and “[t]his would address the pin-delicacy, misalignment, and connector-circuitry problems identified by Chang within the context of the Kwon-Kuo docking station.” *Id.* at 55.

Patent Owner counters that Chang’s female connector is not a main port module having port units directly connecting to an end-user device. PO Resp. 27–32 (citing Ex. 1008 ¶ 25; Ex. 2018 ¶¶ 146, 162). Patent Owner also argues that Chang’s connector is a data port module in which a peripheral device would plug. *Id.* at 29–30; Sur-reply 17. Patent Owner further avers that adding Chang’s connector would collapse the distinction between the data and video port modules and the main port module. PO Resp. 31–32 (citing Ex. 2018 ¶¶ 162–163); Sur-reply 18.

Based on the evidence of record, we are persuaded that Petitioner has shown that the combination of Kwon, Kuo, and Chang teaches a main port module, as required by elements 1.1 and 1.3, and has articulated a sufficient reason to combine the prior art teachings. Patent Owner’s arguments and Dr. Baker’s testimony do not undermine Petitioner’s showing, as they

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improperly attack Chang individually for not disclosing a main port module having port units directly connecting to an end-user device. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426. Petitioner’s asserted ground is based on Kwon in combination with Chang to teach a main port module.

As discussed above in Section II.F.1.b, Kwon teaches male connectors 270 to account for the claimed “first and second port units.” Kwon discloses a system that includes two male connectors 270 for connecting to the laptop when docked on the system. Ex. 1005, 6:44–7:24, Fig. 2. Kwon also discloses that male connectors 270 “are configured to engage with respective female electrical connectors of the computing device.” *Id.* at 7:1–3, Fig. 2. Kwon further discloses that “system 200 also includes outward-facing female electrical connectors 275 in electrical communication with the electrical connectors . . . 270 so that a peripheral device can be attached to the system 200 to communicate with the computing device through one of the electrical connectors . . . 270.” *Id.* at 7:3–24.

In addition, we do not agree with Patent Owner’s arguments and Dr. Baker’s testimony that Chang’s connector is merely a data port module and that adding Chang’s connector would collapse the distinction between the data and video port modules and the main port module. PO Resp. 29–32; Ex. 2018 ¶¶ 162–163; Sur-reply 17–18. Patent Owner and Dr. Baker improperly focus on bodily incorporating Chang’s entire connector module into the combined system of Kwon and Kuo. *Keller*, 642 F.2d at 425 (“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the

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primary reference.”). Further, Chang’s teachings are not limited to female connectors, as Patent Owner alleges. It is well settled that “[a] reference must be considered for everything it *teaches* by way of technology and is not limited to the particular *invention* it is describing and attempting to protect.” *EWP Corp. v. Reliance Univ. Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985); *In re Mills*, 470 F.2d 649, 651 (CCPA 1972) (“All the disclosures in a reference must be evaluated, . . . and a reference is not limited to the disclosure of specific working examples.”).

Moreover, we agree with Petitioner that a relevant artisan would have been motivated “to use a separate, dedicated circuit board like Chang’s to host the connection terminals of Kwon’s male connectors 270 and couple them to the underlying circuit board as Chang discloses,” because “using Chang’s circuit board in Kwon would improve the durability and alignment of Kwon’s male connectors 270.” Pet. 52–55 (citing Ex. 1008 ¶¶ 6–8, 27–28, 32, 34–35, 37, Figs. 5–10; Ex. 1003 ¶¶ 107–109, 111–113). Dr. Franzon testifies that Chang explains that sometimes the port housing and its connection pin are produced separately, making it “not so easy to assemble the conductive pins into the housing because the conductive pins are tiny and flexible.” Ex. 1003 ¶ 108 (citing Ex. 1008 ¶ 6). Dr. Franzon also testifies that the circuit board substrate physically supports and protects the conductive pins from damage while allowing the precise pin alignment during the manufacturing process and that using Chang’s circuit board in Kwon would improve the durability and alignment of Kwon’s male

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connectors 270. *Id.* ¶ 109. We credit Dr. Franzon’s testimony as it is consistent with the prior art of record. Ex. 1008 ¶¶ 6–8, 37.

“If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR*, 550 U.S. at 417. Here, the evidence of record shows that using a separate, dedicated circuit board like Chang’s to host the connection terminals of Kwon’s male connectors 270 and couple them to the underlying circuit board is not beyond the skill of a pertinent artisan, as Chang provides detailed explanations how to apply such a technique. Ex. 1008 ¶¶ 6–8, 27–28, 32, 34–35, 37, Figs. 5–10.

In light of the foregoing, we determine that Petitioner has articulated a sufficient reason to combine Chang with Kwon and Kuo.

In addition, Patent Owner relies upon the same arguments and objective evidence of non-obviousness presented in connection with Ground 1. PO Resp. 48–72. For the same reasons discussed in Section II.F.1.g above, we find that Patent Owner’s objective evidence is accorded little weight here. We conclude that, on balance, the strong evidence of obviousness based on the combination of Kwon, Kuo, and Chang outweighs the weak evidence of non-obviousness. *See Leapfrog*, 485 F.3d at 1162.

For the foregoing reasons, we find that Petitioner has demonstrated by a preponderance of the evidence that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over the combination of Kwon, Kuo, and Chang.

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H. Ground 3 – Obviousness Over O’Shea and Kuo

Petitioner asserts that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over O’Shea and Kuo (Ground 3). Pet. 55–81. During the oral hearing, Petitioner conceded that the combination of O’Shea and Kuo does not teach or suggest a main port module, as required by element 1.1 and as construed above. Tr. 27:11–28:16. Accordingly, because O’Shea and Kuo do not teach or suggest element 1.1, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over O’Shea and Kuo.

I. Ground 4 – Obviousness Over O’Shea, Kuo, and Chang

Petitioner asserts that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over O’Shea, Kuo, and Chang (Ground 4). Pet. 81–82. For the reasons provided below, we find that Petitioner has demonstrated by a preponderance of the evidence that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over O’Shea, Kuo, and Chang.

1. Claim 1

Petitioner asserts that the combination of O’Shea, Kuo, and Chang discloses all of the limitations recited in claim 1 and that a relevant artisan would have had a reason to combine the prior art teachings. Pet. 55–74. Based on the evidence of record, we are persuaded by Petitioner’s showing.

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a. Preamble – port extension apparatus

The preamble of claim 1 recites “[a] port extension apparatus for extending ports of an end-user device.” Petitioner asserts that O’Shea’s connector device teaches the claimed “port extension apparatus” because O’Shea’s connector device includes a plurality of input ports for coupling to ports of a laptop computer and a plurality of output ports for transmitting and receiving electrical signals between the portable computer and external peripheral devices. Pet. 55–58 (citing Ex. 1007, code (57), 1:49–55, 5:47–57, Figs. 6, 7). Patent Owner does not dispute that showing regarding the preamble of claim 1. We find that Petitioner has shown that O’Shea teaches the preamble of claim 1.

b. Element 1.1 – main port module having first and second port units

Petitioner argues that O’Shea’s input ports 28, 30 disclose the claimed “first and second port units.” Pet. 81–82 (citing Ex. 1007, Fig. 6).

Petitioner asserts that a relevant artisan would have used Chang’s circuit board 2 to implement O’Shea’s USB ports because “O’Shea’s input ports also must connect to the underlying circuitry of the docking station device like the ports connect to Chang’s circuit board.” *Id.* Petitioner avers that such an artisan “would have wanted to use Chang’s teachings about the circuit board to address the same pin-delicacy, pin-alignment, and circuitry issues with O’Shea’s input ports.” *Id.* at 82.

Patent Owner advances several arguments. PO Resp. 32–33. First, Patent Owner argues that “O’Shea does not teach a main port module

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interacting with a system and having a boundary distinct from other modules, wherein the main port module contains two and only two port units, for directly connecting to an end-user device.” *Id.* (citing Ex. 2018 ¶¶ 165, 168–169); Sur-reply 18–19. This argument is unavailing. As discussed above in Section II.A.1.e, we decline to adopt Patent Owner’s construction that requires a main port module having only two port units.

Second, Patent Owner argues that O’Shea does not disclose a main port module. PO Resp. 32–33; Sur-reply 18–19. However, Patent Owner’s arguments improperly attack O’Shea individually. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426. Petitioner’s asserted ground is based on the combination of O’Shea and Chang to teach a main port module.

Third, Patent Owner argues that the connector in Chang is a port module that has data and video port modules, that it is not a main port module, and that Petitioner’s argument would collapse the distinction between port modules and the main port module. PO Resp. 45 (citing Ex. 2018 ¶ 208). However, as discussed above in Section II.G, Patent Owner improperly attacks Chang individually for not disclosing a main port module having port units directly connecting to an end-user device. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426. Petitioner’s asserted ground is based on O’Shea in view of Chang to teach a main port module. It is undisputed that O’Shea’s USB input ports 28 and 30 directly connect with the ports on the portable computer. Ex. 1007, 3:1–3.

In addition, Patent Owner and Dr. Baker improperly focus on bodily incorporating Chang’s entire connector module into O’Shea’s system.

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Keller, 642 F.2d at 425 (“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.”). Also, Chang’s teachings are not limited to female connectors, as Patent Owner and Dr. Baker allege. It is well settled that “[a] reference must be considered for everything it *teaches* by way of technology and is not limited to the particular *invention* it is describing and attempting to protect.” *EWP*, 755 F.2d at 907; *Mills*, 470 F.2d at 651.

Moreover, we agree with Petitioner that a relevant artisan would have been motivated to use a separate, dedicated circuit board like Chang’s to implement O’Shea’s USB ports because using Chang’s circuit board in O’Shea would improve the durability and alignment of O’Shea’s male connectors. Pet. 81–82 (citing Ex. 1007, Figs. 2, 3, 6; Ex. 1008, Figs. 1–3; Ex. 1003 ¶ 150). Dr. Franzon testifies that Chang explains that sometimes the port housing and its connection pin are produced separately, making it “not so easy to assemble the conductive pins into the housing because the conductive pins are tiny and flexible.” Ex. 1003 ¶ 108 (citing Ex. 1008 ¶ 6). Dr. Franzon also testifies that the circuit board substrate physically supports and protects the conductive pins from damage while allowing the precise pin alignment during the manufacturing process. *Id.* ¶ 109. Dr. Franzon further testifies that a relevant artisan would have used Chang’s teachings about the circuit board to address the pin-delicacy, pin-alignment, and common circuitry issues with O’Shea’s input ports 28, 30. *Id.* ¶ 150. We credit Dr. Franzon’s testimony as it is consistent with the prior art of record. Ex. 1008 ¶¶ 6–8, 37.

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“If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR*, 550 U.S. at 417. Here, the evidence of record shows that using a separate, dedicated circuit board like Chang’s to host the connection terminals of O’Shea’s ports and couple them to the underlying circuit board is not beyond the skill of a pertinent artisan, as Chang provides detailed explanations how to apply such a technique. Ex. 1008 ¶¶ 6–8, 27–28, 32, 34–35, 37, Figs. 5–10.

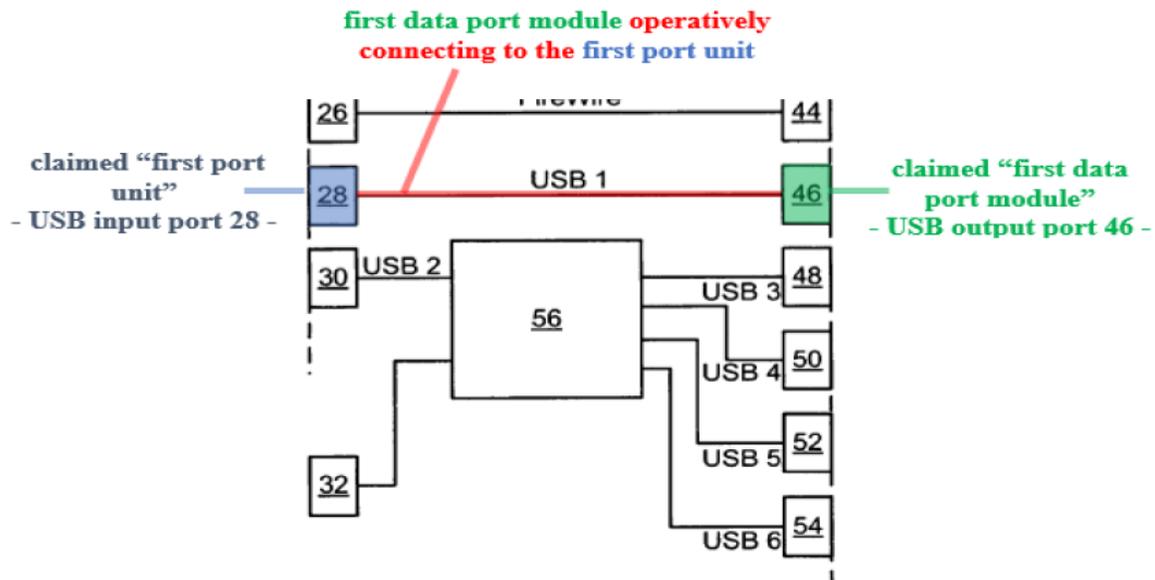
In light of the foregoing, we find that Petitioner has shown that the combination of O’Shea and Chang discloses element 1.1 and has articulated an adequate reason to combine Chang with O’Shea.

c. Elements 1.2 and 1.3 – first data port module

For elements 1.2 and 1.3, Petitioner asserts that O’Shea discloses a first data port module, as required by these elements. Pet. 64–66. Petitioner explains that O’Shea discloses that, when a peripheral device (to-be-connected device) connects to USB port 46 (first data port module), USB port 46 and USB port 28 (first port unit) form a transmission path enabling data transmission between the peripheral device and the laptop (end-user device). *Id.* (citing Ex. 1007, 4:15–19, Figs. 1, 6; Ex. 1003 ¶¶ 122–124).

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Petitioner’s annotated Figure 1 of O’Shea is reproduced below. *Id.*



Annotated Figure 1 of O’Shea above is a simplified function block diagram of a connector device. As shown above, USB input port 28 (blue) of O’Shea is directly connected (red) to USB output port 46 (green). Petitioner notes that O’Shea states that “USB port 28 is electronically coupled in a conventional manner to USB port 46 to provide a USB transmission path between the ports.” *Id.* (citing Ex. 1007, 4:15–19; Ex. 1003 ¶ 124).

Patent Owner counters that Petitioner fails to show that a pertinent artisan would have understood the meaning of “conventional manner.” PO Resp. 33; Sur-reply 19 (citing Ex. 2018 ¶¶ 165, 182; Ex. 1003 ¶¶ 118, 124).

However, Figure 1 of O’Shea clearly shows a direct transmission path between USB input port 28 and USB output port 46 that does not proceed

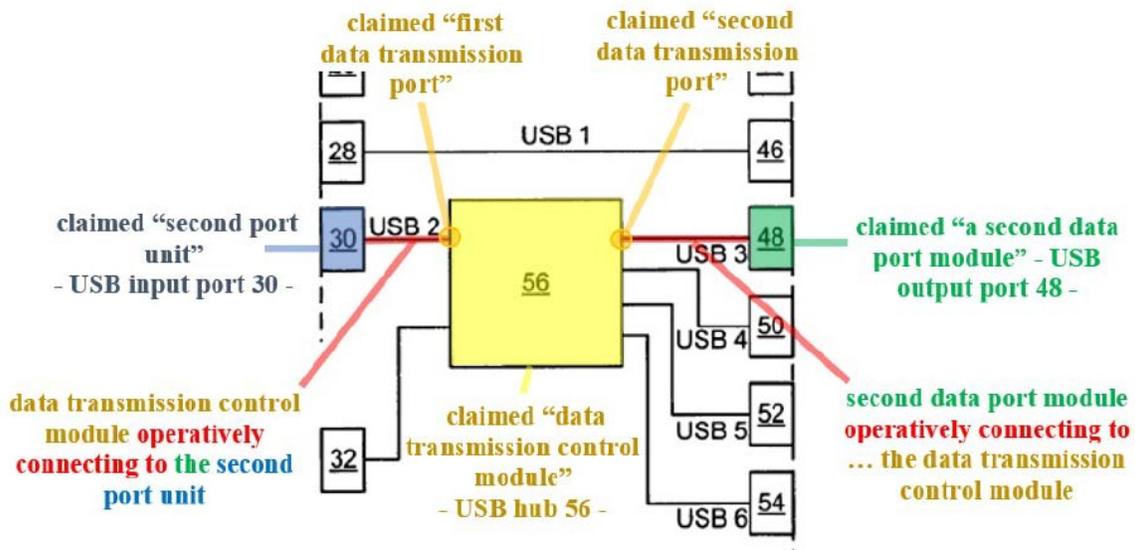
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through hub 56 (DTCM). In light of the foregoing, we find that Petitioner has shown that O’Shea in view of Chang discloses elements 1.2 and 1.3.

d. Element 1.4 – DTCM

Petitioner asserts that O’Shea discloses element 1.4 because O’Shea discloses USB hub 56 (DTCM) operatively connected to four USB output ports 48–54 via respective DTPs. Pet. 67–68 (citing Ex. 1007, 2:57–3:15, 4:20–28, 4:35–38, 5:13–17, Fig. 1). Petitioner’s annotated Figure 1 of O’Shea is reproduced below. *Id.*



Annotated Figure 1 of O’Shea above shows USB hub 56 (DTCM) (yellow) connected to USB input port 30 (second port unit) (blue) via USB 2 line (first DTP) (red). Petitioner asserts that O’Shea’s hub 56 is a DTCM because it is “a conventional device that allows many USB devices to connect to port [30] via ports 48-54.” *Id.* at 68 (alteration by Petitioner) (citing Ex. 1007, 4:20–28, 2:57–3:15, 4:35–38; Ex. 1003 ¶ 126; Ex. 1011).

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Patent Owner counters that O’Shea’s USB hub 56 is not a DTCM because “O’Shea does not teach data transmission control.” PO Resp. 34–35. However, Patent Owner’s argument rests on its construction that requires a “data transmission controller performing in accordance with an industry standard data transmission protocol.” As discussed in Section II.A.2, we decline to adopt that construction in view of the claim language and Specification.

In addition, O’Shea discloses that its hub 56 is “a conventional device that allows many USB devices to connect to port [30] via ports 48–54.” Ex. 1007, 4:20–28. Dr. Franzon testifies that, “before the ’429 patent, such conventional USB hubs were known to perform . . . routing addressed data between a[] host and the various USB devices connected to the hub during communication with the host computer.” Ex. 1003 ¶ 126. We credit Dr. Franzon’s testimony as it is consistent with the prior art of record. Ex. 1011, 4; Ex. 1007, 2:57–3:15, 4:20–28, 4:35–38. Indeed, Patent Owner admits that “[a]s of the ’429 Patent’s priority date, certain data transmission controls existed in the prior art in the form of commercially available integrated circuits known as hub controllers.” PO Resp. 9. Dr. Baker also admits that “manufacturers of computers, connectors and peripherals came to market with numerous integrated circuits that implemented the USB 2.0 and 3.1 hubs connecting the host with peripheral devices,” providing known examples in the art, e.g., a single IC, USB Type-C, smart hubs supporting seven ports, Ex. 2028. Ex. 2018 ¶¶ 84–88 (citing Exs. 2024–2029).

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Based on the evidence of record, we determine that Petitioner has established that O’Shea discloses element 1.4.

e. Elements 1.5 and 1.6 – second data port module

Petitioner asserts that O’Shea discloses these elements. Pet. 68–69. Petitioner explains that O’Shea discloses USB port 30 (second port unit), coupling to a laptop (end-user device), and USB port 48 (second data port module), connecting to a peripheral device (to-be-connected device), for transmitting and receiving electric signals between the laptop and the external peripheral device via the USB hub (DTCM). *Id.* (citing Ex. 1007, 3:6–15, 4:20–22, Figs. 1, 2). Patent Owner does not dispute Petitioner’s showing regarding these elements. Based on the evidence of record, we find that Petitioner has established that O’Shea teaches elements 1.5 and 1.6.

f. Elements 1.7 and 1.8 – video port module and reason to combine

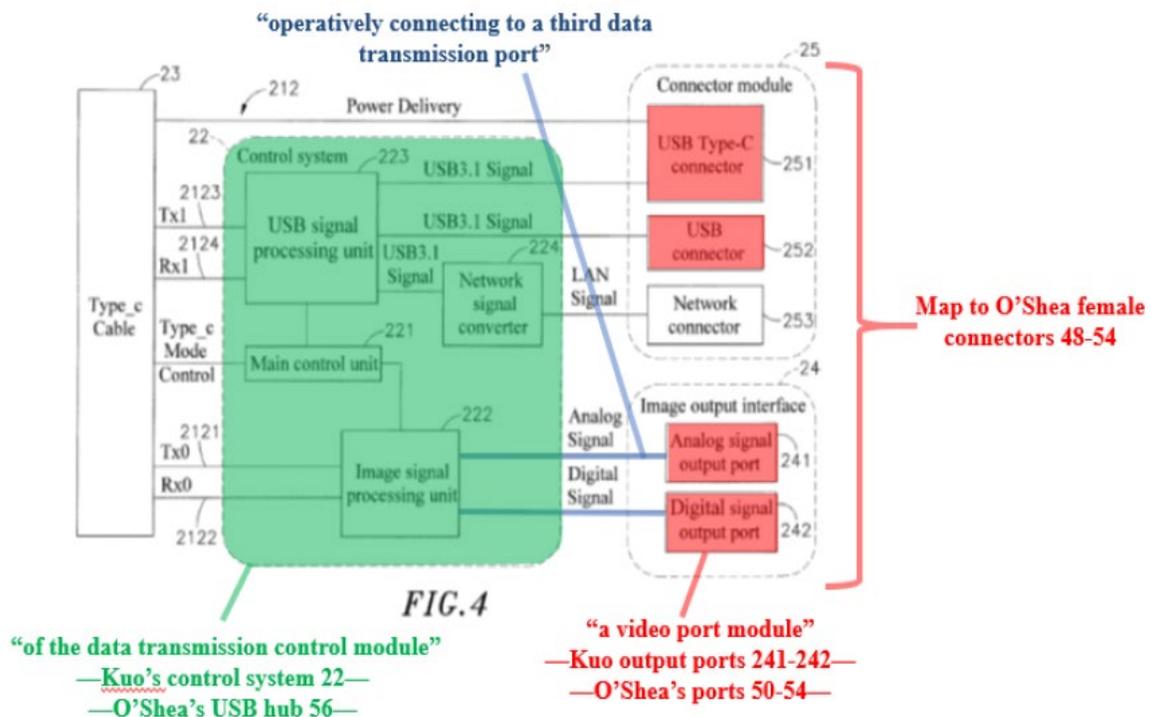
At the outset, Patent Owner argues that Kuo is not prior art. PO Resp. 21–26, 35; Sur-reply 9–16, 19. Patent Owner also argues that O’Shea does not disclose elements 1.7 and 1.8. PO Resp. 35; Sur-reply 19. Patent Owner’s arguments are unavailing. As discussed above in Section II.E, we determine that Kuo qualifies as prior art against the challenged claims. Furthermore, Patent Owner’s arguments improperly attack O’Shea individually. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426.

Based on the evidence of record, we find that Petitioner has shown that O’Shea in view of Kuo discloses elements 1.7 and 1.8. In its Petition, Petitioner asserts that, although “O’Shea does not disclose a video port

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module,” “Kuo’s analog signal output port 241 and/or digital signal output port 242 for an external monitor discloses the claimed video port module.” Pet. 70–74. (citing Ex. 1006 ¶¶ 21, 23, 26, Fig. 4). Petitioner’s annotated Figure 4 of Kuo is reproduced below. *Id.* at 70.



Annotated Figure 4 of Kuo above shows control system 22 (DTCM) (green) operatively connected to image output ports 241, 242 (video port module) (red) via a third DTP (blue). Petitioner notes that Kuo teaches that analog signal output port 241 may be a VGA connector and digital signal output port 242 may be an HDMI connector. *Id.* at 71 (citing Ex. 1006 ¶ 23). Petitioner explains that Kuo teaches, when an external monitor (to-be-connected device) connects to video connectors 241, 242 (video port module), control system 22 (DTCM) receives the to-be-displayed

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information from the host computer (end-user device) and outputs it to the external monitor to display. *Id.* (citing Ex. 1006 ¶¶ 21, 26; Ex. 1003 ¶ 131).

Based on the evidence of record, we find that Petitioner has shown that O’Shea in view of Kuo teaches elements 1.7 and 1.8.

g. Reason to combine O’Shea and Kuo

Petitioner argues that a relevant artisan would have incorporated Kuo’s digital signal output port 242 as one of O’Shea’s output ports and updated O’Shea’s hub to include the necessary video functionality of Kuo’s control system because it would update O’Shea’s connector device with modern display technology “for compatibility with the new laptops and displays that it would be interfacing.” Pet. 71–74; Ex. 1003 ¶¶ 132–136.

Patent Owner advances several arguments. First, Patent Owner contends that a relevant artisan would not have combined O’Shea with Kuo because O’Shea published in 2007. PO Resp. 36–45. However, “[t]he mere age of the references is not persuasive of the unobviousness of the combination of their teachings, absent evidence that, notwithstanding knowledge of the references, the art tried and failed to solve the problem.” *In re Wright*, 569 F.2d 1124, 1127 (CCPA 1976). Patent Owner presents no evidence of a long-felt need or the failure of others.

Second, Patent Owner argues that Kuo teaches away from element 1.3 because Kuo’s ports are connected via control system 22 (Ex. 1006, Fig. 2), meaning the “conventional” transmission path would be indirect rather than direct. PO Resp. 39 (citing Ex. 2018 ¶ 190; Ex. 1006, Fig. 4). Patent

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Owner’s argument is unavailing, as it attempts to improperly bodily incorporate Kuo’s system into O’Shea’s system. *Keller*, 642 F.2d at 425. Petitioner does not rely on Kuo to teach the first port unit recited in element 1.3. Pet. 64–66. The combined system of O’Shea and Kuo would not change the direct connection between O’Shea’s USB input port 28 (first port unit) and USB output port 46 (first data port module), shown in Figure 1 of O’Shea. Moreover, the “mere disclosure of alternative designs does not teach away.” *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004).

Finally, Patent Owner argues that there is no motivation to combine O’Shea and Kuo because “O’Shea teaches a docking station that arranges ports to match a given computer,” whereas “Kuo teaches a much more flexible hub device with a single connection cable for connecting to the computer to a variety of peripheral devices.” PO Resp. 39–40 (citing Ex. 2018 ¶¶ 192–193). Patent Owner also argues that a pertinent artisan would have upgraded O’Shea’s existing video ports 18, 34, 36 with HDMI, and would not want to replace the USB ports because USB ports are among “the most universal and common connectivity solutions on the market to this day.” *Id.* at 41–45 (citing Ex. 2018 ¶¶ 196–198; Ex. 1006 ¶ 6). Patent Owner also further argues that there is no reason for updating O’Shea’s hub with Kuo’s control system. *Id.* at 42–43 (citing Ex. 2018 ¶ 199).

Patent Owner’s arguments are unavailing. Dr. Franzon testifies that O’Shea specifically designed the docking station to interface with a 13” DVI MacBook, but by the time of Kuo, HDMI and DisplayPort had superseded DVI and more recent laptops supported dual monitors. Ex. 1003

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¶¶ 132–133 (citing Ex. 1007, 3:1–5; Ex. 1012, 1; Ex. 1006 ¶¶ 7, 23).

Dr. Franzon also testifies that a pertinent artisan would have modernized the video technology for compatibility with the new laptops and displays with which it would be interfacing. *Id.* Dr. Franzon further testifies that such an artisan would have recognized that O’Shea’s docketing station does not necessarily need all five USB output ports 46–48 and would have replaced one of the USB ports 50–54 on hub 56 with Kuo’s HDMI output port 242. Ex. 1003 ¶ 133 (citing Ex. 1007, 3:41–43, 4:17–19, 5:15–17). Dr. Franzon testifies that, as part of the combination, such an artisan “would have updated O’Shea’s hub to include the necessary functionality of Kuo’s control system,” such as image signal processing unit 222 and main control unit 221 of Kuo, to handle the added video capabilities. Ex. 1003 ¶ 134 (citing Ex. 1006 ¶¶ 21–26). We credit Dr. Franzon’s testimony as it is consistent with other evidence of record. Ex. 1007, 3:1–5; Ex. 1012, 1; Ex. 1006 ¶¶ 7, 23; Ex. 2100 ¶ 15. Indeed, Kuo has only two USB connectors. Ex. 1006, Fig. 4. The ’429 patent also discloses a system with three USB ports. Ex. 1001, Fig. 2. The combined system of O’Shea and Kuo would still be able to provide three or four USB ports.

“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR*, 550 U.S. at 417. Here, the evidence of record shows that modernizing O’Shea’s video capabilities with Kuo’s new video technology is not beyond the skill of a pertinent artisan, as

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Kuo provides detailed explanations how to apply such a technique.

Ex. 1006 ¶¶ 21–26, Fig. 4. In light of the foregoing, we find that Petitioner has articulated a reason to combine the teachings of O’Shea and Kuo.

h. Objective evidence of non-obviousness

Patent Owner relies upon the same arguments and objective evidence of non-obviousness presented in connection with Ground 1. PO Resp. 48–72. For the same reasons discussed above in Section II.F.1.g, we determine that Patent Owner’s objective evidence is accorded little weight here. We conclude that, on balance, the strong evidence of obviousness based on the combination of O’Shea, Kuo, and Chang outweighs the weak evidence of non-obviousness. *See Leapfrog*, 485 F.3d at 1162.

i. Conclusion on Claim 1

Petitioner has shown by a preponderance of the evidence that claim 1 is unpatentable under § 103 as obvious over O’Shea, Kuo, and Chang.

2. Claims 2–6 and 13–17

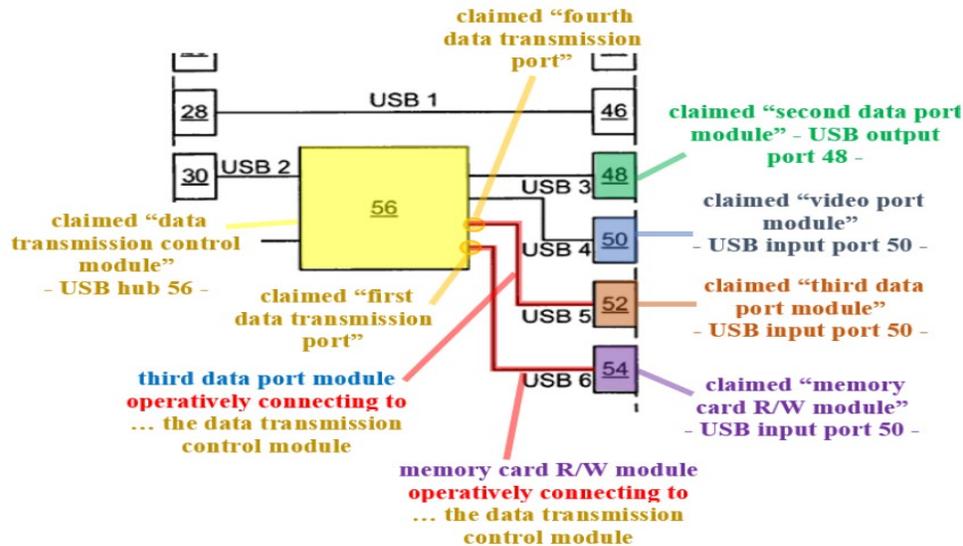
a. Claims 2 and 3

Petitioner asserts a pertinent artisan would have been motivated to implement a memory card reader as an additional port and modify O’Shea’s hub to convert data between USB format and the format of the memory card for read/write operations because memory card readers were common on docking stations before the ’429 patent. Pet. 75–76 (citing Ex. 1003 ¶ 138).

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Petitioner’s annotated Figure 1 of O’Shea is reproduced below.



Pet. 75. As shown in annotated Figure 1 of O’Shea above, the combined system would include: a third data port module (brown) operatively connecting (first red line) to a fourth DTP (dark yellow); and a memory card module (purple) operatively connecting (second red line) to a data read/write port (dark yellow) of the DTCM (light yellow) so that a memory card connects to the laptop via the memory card module and the DTCM. Pet. 75.

Patent Owner counters that, given the importance of USB ports to O’Shea’s design, a pertinent artisan would not have wanted to use a memory card reader as an additional port. PO Resp. 46 (citing Ex. 2018 ¶ 211). Patent Owner also argues that neither O’Shea nor Kuo discloses a memory card module, as required by claim 2, and claim 3 would not have been obvious because it depends from claim 2. *Id.*

Patent Owner’s arguments are unavailing. Because the memory card reader would be an additional port supported by O’Shea’s hub 56, no USB

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port would be replaced. Further, the test for obviousness is whether the references, taken as a whole, would have suggested the claimed subject matter to one of ordinary skill in the art at the time the invention was made. *Merck*, 800 F.2d at 1097. “[T]he knowledge of such an artisan is part of the store of public knowledge that must be consulted when considering whether a claimed invention would have been obvious.” *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362–63 (Fed. Cir. 2013). “Regardless of the tribunal, the inquiry into whether any ‘differences’ between the invention and the prior art would have rendered the invention obvious to a skilled artisan necessarily depends on such artisan’s knowledge.” *Koninklijke Philips v. Google, LLC*, 948 F.3d 1330, 1337–39 (Fed. Cir. 2020) (holding that § 311(b) does not prohibit use of general knowledge to supply a missing claim limitation in an *inter partes* review, and that “Google properly alleged that a skilled artisan would have known about pipelining and been motivated to combine pipelining with SMIL 1.0”).

Dr. Franzon testifies that memory card readers were a common feature on docking stations at the time of the invention. Ex. 1003 ¶¶ 137, 138. Dr. Franzon also testifies that “[m]icro-SD memory cards were and remain very commonly used for data storage in cameras and smart phones” and that “[h]aving a means for rapid media download in a docking station would be a marketing advantage for that docking station.” *Id.* ¶ 138. We credit Dr. Franzon’s testimony as it is consistent with other evidence of record. Indeed, Kwon, prior art of record, discloses a system having “a port

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to receive a flash memory card (e.g., SD Card, Memory stick, or xD card).”

Ex. 1005, 10:37–39.

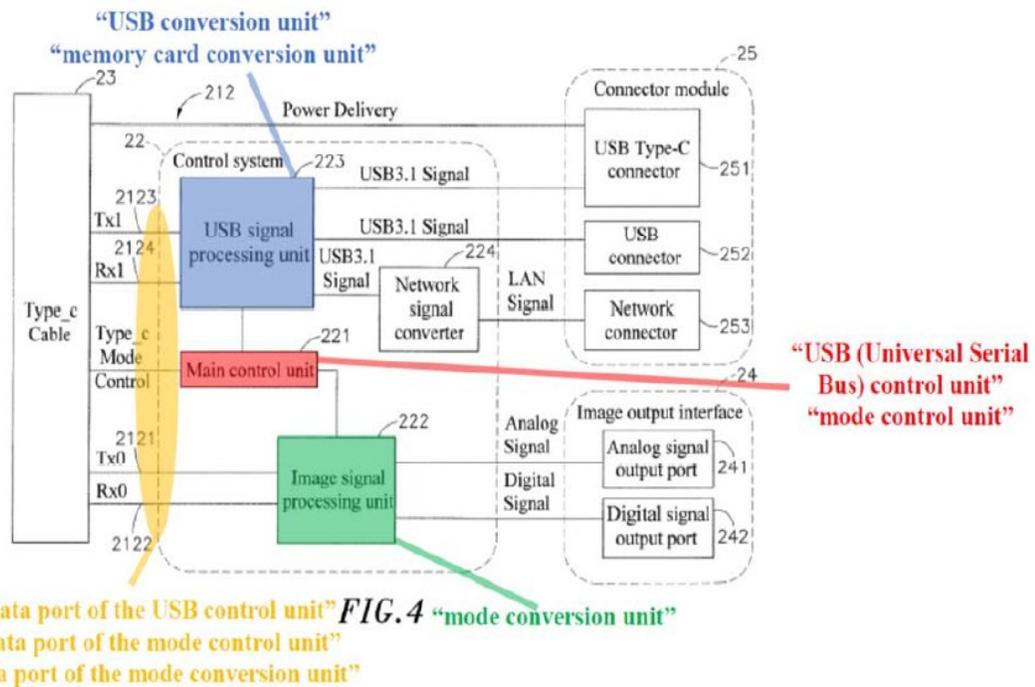
We also agree with Dr. Franzon that a pertinent artisan would have been motivated to implement a memory card reader as an additional port supported by O’Shea’s hub 56 to provide a means for rapid media download. Ex. 1003 ¶¶ 137, 138. O’Shea discloses that “[i]nput ports 18-30 are preferably compatible with like ports provided by a portable or laptop computer and thus directly connect or dock with the ports on the portable computer,” such as a 13 DVI MacBook. Ex. 1007, 3:1–5. A pertinent artisan would have been motivated to update O’Shea’s device to match newer laptops and to provide a common feature for rapid media download.

In light of the foregoing, we find that Petitioner has shown that O’Shea in light of Kuo suggests the elements of claims 2 and 3.

b. Claims 4–6

Relying on its analysis for Ground 1, Petitioner explains how Kuo discloses the DTCM including the units recited in claim 4. Pet. 76–79. As discussed above in Section II.F.2.b, we agree. Petitioner’s annotated Figure 4 of Kuo is reproduced below.

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Pet. 79. As annotated Figure 4 of Kuo above shows, control system 22 teaches the DTCM, main control unit 221 (red) teaches the USB control unit and mode control unit, USB signal processing unit 223 (blue) teaches the USB conversion unit and the memory card conversion unit, and image signal processing unit 222 (green) teaches the mode conversion unit. *Id.*

For claim 5, Petitioner asserts that the channels (orange) in the annotated Figure above correspond to the first DTP of the DTCM because they connect to main control unit 221 and image signal processing unit 222. *Id.* at 42–43 (citing Ex. 1006 ¶¶ 22, 25; Ex. 1003 ¶ 92).

For claim 6, Petitioner asserts that the connection of control system 22 to USB-C connector 251 in Kuo corresponds to the claimed second DTP. *Id.* at 43–45. Petitioner also asserts that a relevant artisan would have been

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motivated to implement USB signal processing unit 223 and main control unit 221 as a single unit having the functionality of both units, so main control unit 221 could convert the data itself, reducing the number of components (e.g., computer chips) needed to make the docking station, cost, and size of the docking station. *Id.* (citing Ex. 1003 ¶¶ 93–96).

Patent Owner counters that “O’Shea fails to teach the additional elements of Claim 4” and that a pertinent artisan would not combine O’Shea and Kuo. PO Resp. 46 (citing Ex. 2018 ¶ 215). Patent Owner also argues that claims 5 and 6 also would not have been obvious because they depend from claim 4. However, Patent Owner’s argument improperly attacks O’Shea individually, when Petitioner’s argument for claim 4 is premised on the combined teachings of O’Shea and Kuo. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426.

In addition, as discussed above in Sections II.I.1.f–g, we determine that Petitioner has articulated a reason that a relevant artisan would have incorporated Kuo’s main control unit 221 (USB control unit) and image signal processing unit 222 (mode conversion unit) into O’Shea’s hub 56 to modernize the video capabilities of O’Shea’s connector device. Dr. Franzon testifies that such an artisan also would have added Kuo’s USB signal processing unit 223 (USB conversion unit) to O’Shea’s hub 56 for converting one type of USB signal to another type of USB signal (e.g., USB 3.0 into USB 3.1) because this would improve the utility of O’Shea’s connector device so that it would be able to support peripheral devices

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operating according to various USB protocols. Ex. 1003 ¶¶ 141–143 (citing Ex. 1006 ¶ 21, Fig. 4).

Based on the evidence of record, we find that Petitioner has shown that O’Shea in view of Kuo teaches the elements of claims 4–6 and has articulated a reason to combine the teachings of O’Shea and Kuo.

c. Claims 13–17

Petitioner asserts that O’Shea in light of Kuo would have rendered claims 13–17 obvious. Pet. 79–81. Petitioner asserts that Kuo’s HDMI port 241 teaches a video port module, as required by claim 13. *Id.* at 79. Petitioner contends that O’Shea in view of Kuo teaches the first data port module comprising a USB Type-C connector, as required by claim 14. *Id.* at 79–80 (citing Ex. 1007, 4:15–28; Ex. 1006, Figs. 1, 2). Petitioner argues that O’Shea in view of Kuo teaches the second data port module comprising a USB female port, as required by claim 15. *Id.* at 80 (citing Ex. 1007, 4:20–28; Ex. 1003 ¶ 147). Petitioner submits that O’Shea in view of Kuo suggests the third data port module comprising a Type-C female port, as required by claim 16. *Id.* at 79–80 (citing Ex. 1007, 4:15–28; Ex. 1006 ¶ 6; Ex. 1003 ¶ 146). Petitioner further asserts that O’Shea in view of Kuo suggests the first port unit comprising a USB male port, as required by claim 17. *Id.* at 80–81 (citing Ex. 1007, 4:15–28, Fig. 6; Ex. 1003 ¶ 148).

Patent Owner counters that claims 13–17 depended from claim 2 would not have been obvious because O’Shea in view of Kuo lacks the elements of claim 2. PO Resp. 45–46 (citing Ex. 2018 ¶¶ 210, 217).

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However, as discussed above, we find that Petitioner has shown adequately that O’Shea in view of Kuo teaches the elements of claim 2.

Based on Petitioner’s persuasive contentions and evidence, summarized above, we find that Petitioner has shown that O’Shea in view of Kuo teaches or suggests the limitations of claims 13–17.

e. Objective evidence of non-obviousness

Patent Owner relies upon the same arguments and objective evidence for Ground 1. PO Resp. 48–72. For the same reasons discussed above in Section II.F.1.g, we determine that Patent Owner’s objective evidence is accorded little weight here. We conclude that, on balance, the strong evidence of obviousness based on O’Shea, Kuo, and Chang outweighs the weak objective evidence of non-obviousness. *See Leapfrog*, 485 F.3d at 1162; *Pfizer*, 480 F.3d at 1372. Thus, we conclude that Petitioner has established by a preponderance of the evidence that claims 2–6 and 13–17 are unpatentable under § 103 as obvious over O’Shea, Kuo, and Chang.

3. Conclusion on Obviousness based on O’Shea, Kuo, and Chang

For the foregoing reasons, we find that Petitioner has demonstrated by a preponderance of the evidence that claims 1–6 and 13–17 are unpatentable under § 103 as obvious over O’Shea, Kuo, and Chang.

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III. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has established by a preponderance of the evidence that claims 1–6 and 13–17 of the ’429 patent are unpatentable.

In summary:

Claims	35 U.S.C. §	Reference(s) /Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–6, 13–17	103	Kwon, Kuo	1–6, 13–17	
1–6, 13–17	103	Kwon, Kuo, Chang	1–6, 13–17	
1–6, 13–17	103	O’Shea, Kuo		1–6, 13–17
1–6, 13–17	103	O’Shea, Kuo, Chang	1–6, 13–17	
Overall Outcome			1–6, 13–17	

IV. ORDER⁸

For the foregoing reasons, it is

ORDERED that claims 1–6 and 13–17 of the ’429 patent are unpatentable;

⁸ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application

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FURTHER ORDERED that the parties agree upon and file, as a Paper, a redacted public version of this Final Written Decision within ten business days of the entry date of this Final Written Decision; 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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or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).