

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DELL INC., DELL TECHNOLOGIES INC., HP INC., AND LENOVO (UNITED STATES) INC.,

Petitioner

v.

UNIVERSAL CONNECTIVITY TECHNOLOGIES INC.,

Patent Owner.

DECLARATION OF ERIC WELCH

Case No. IPR2024-01479

Mail Stop Patent Board
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
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TABLE OF CONTENTS

I.	Introduction.....	1
II.	Background and Qualifications	2
III.	Documents and Materials Considered.....	4
IV.	Relevant Legal Principles	5
V.	Person of Ordinary Skill in the Art.....	9
VI.	'265 Patent	10
	A. Overview	10
	B. Prosecution History	20
	C. Summary of the Prosecution of EP12762781.8	23
	D. Summary of the Prosecution of JP2014502838 A	26
VII.	Technology Background.....	27
VIII.	Claim Construction.....	29
IX.	Summary of Opinions.....	31
	A. Overview of Iwamoto (EX1005, translation at EX1006)	32
	B. Overview of Hsieh (EX1008)	36
	C. Overview of Knight (EX1007).....	39
	D. Overview of HDMI 1.3a (EX1010)	43
X.	Claims 1, 4-5, 8, 11, and 14-16 are Invalid	45
	A. Ground 1: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over Iwamoto	45
	1. Claim 1	45

2.	Claim 4: “The method of claim 1, further comprising: performing an AV data exchange between the first device and the second device.”	62
3.	Claim 5	63
4.	Claim 8	65
5.	Claim 11	72
6.	Claim 14	74
7.	Claim 15: “The system of claim 14, further comprising: detector logic to detect, while the communication logic is in the default operation mode, a coupling of the system to an AV device via the connector; and wherein the communication logic is further configured to perform an AV data exchange with the AV device in response to the detection.”	75
8.	Claim 16: “The system of claim 15, wherein the detector logic is further configured to detect a change to the connectivity after the AV data exchange, wherein, in response to the detected change to the connectivity, the control logic further configured to place the communication logic into the AV sink operation mode.”	75
B.	Ground 2: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over Iwamoto in Combination with Hsieh	76
1.	Motivation to Combine Iwamoto and Hsieh.	76
2.	Claims 1, 8, and 14.....	79
C.	Ground 3: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over Iwamoto in Combination with Knight.....	81
1.	Motivation to Combine Iwamoto and Knight.....	81
2.	Claims 1, 8, and 14.....	85
D.	Ground 4: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over Hsieh in Combination with Iwamoto	87

1.	Motivation to Combine Hsieh and Iwamoto.....	87
2.	Claim 1	89
3.	Claim 4: “The method of claim 1, further comprising: performing an AV data exchange between the first device and the second device.”	100
4.	Claim 5.....	100
5.	Claim 8.....	101
6.	Claim 11	107
7.	Claim 14.....	107
8.	Claim 15: “The system of claim 14, further comprising: detector logic to detect, while the communication logic is in the default operation mode, a coupling of the system to an AV device via the connector; and wherein the communication logic is further configured to perform an AV data exchange with the AV device in response to the detection.”	109
9.	Claim 16: “The system of claim 15, wherein the detector logic is further configured to detect a change to the connectivity after the AV data exchange, wherein, in response to the detected change to the connectivity, the control logic further configured to place the communication logic into the AV sink operation mode.”	111
E.	Grounds 5-8: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over the References in Any of Grounds 1-4 in Further Combination with HDMI 1.3a.....	111
1.	Motivation to Combine Iwamoto (Grounds 1-3) or Hsieh (Ground 4) with HDMI 1.3a	112
2.	Claims 1, 8, and 14.....	113

TABLE OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 9,232,265 (the “’265 Patent”)
1002	Prosecution history of the ’265 Patent
1003	Declaration of Eric Welch
1004	Curriculum Vitae of Eric Welch
1005	JP 2009-60204 A to Iwamoto (“Iwamoto”)
1006	Certified English Translation of Iwamoto
1007	U.S. Pat. App. Pub. No. 2008/0028237 A1 to Knight (“Knight”)
1008	U.S. Pat. App. Pub. No. 2009/0046690 A1 to Hsieh (“Hsieh”)
1009	High-Definition Multimedia Interface V1.3a (HDMI 1.3a)
1010	Declaration of Steve Venuti regarding HDMI 1.3a
1011	EP2692118 B1
1012	Prosecution history of European Patent Application No. EP12762781.8 published as EP2692118 B1
1013	JP 2014509821 A
1014	Prosecution history of Japanese Patent Application No. JP2013502838A published as JP 2014-509821 A
1015	Declaration of Nathaniel Frank-White Regarding WayBack Machine URLs
1016	On-The-Go Supplement to the USB 2.0 Specification, Revision 1.0a (June 24, 2003).
1017	U.S. Patent App. Pub. No. 2004/0019732 A1 to Overtoom et al. (“Overtoom”)
1018	U.S. Patent App. Pub. No. 2008/0005262 A1 to Wurzburg et al. (“Wurzburg”)
1019	U.S. Patent App. Pub. No. 2007/0255885 A1 to Bohm et al. (“Bohm”)
1020	Miguel Usach Merino, <i>Powering ICs On and Off</i> , available at https://www.analog.com/media/en/analog-dialogue/volume-49/number-1/articles/powering-ics-on-and-off.pdf . (“Merino”)
1021	U.S. Pat. App. Pub. No. 2010/0183004 A1 to Kobayashi (“Kobayashi”).
1022	U.S. Pat. App. Pub. No. 2010/0199298 A1 to Kabuto et al. (“Kabuto”)
1023	Microchip, Reset: <i>Causes and Effects</i> (Aug. 19, 2006), available at https://web.archive.org/web/20060819200514/https://ww1.microchip.com/downloads/en/devicedoc/reset.pdf

I. Introduction

1. My name is Eric Welch. I have prepared this Declaration in connection with Dell Inc., Dell Technologies Inc., HP Inc., and Lenovo (United States) Inc.’s Petition for *Inter Partes* Review of U.S. Patent No. 9,232,265 (the “’265 Patent”) (EX1001), which is to be filed concurrently with this Declaration.

2. In the course of preparing this Declaration, I reviewed the ’265 Patent, its prosecution file history, as well as the other documents discussed in this Declaration.

3. I have been retained by Dell Inc., Dell Technologies Inc., HP Inc., and Lenovo (United States) Inc. (“Petitioners”) as an expert in the fields of electrical and software engineering, and product development for consumer, medical, industrial, aerospace, and other applications. I have been asked to provide my opinion regarding the state of the art of the technology described in the ’265 Patent and on the patentability of the claims of this patent. I am being compensated at my normal consulting rate for my time. My compensation is not dependent on and in no way affects the substance of my statements in this Declaration. I have no financial interest in the Petitioners, the ’265 Patent, or the owner of the ’265 Patent.

II. Background and Qualifications

4. My professional qualifications, experience, publications, and presentations, as well as a list of previous cases in which I have provided expert testimony, are outlined in my curriculum vitae (EX1004).

5. I am an expert with over 50 years of experience in the fields of electrical and software engineering, and product development for consumer, medical, industrial, aerospace, and other applications.

6. From 1976 to 2007, I was Vice President of Engineering and CTO of InnoSys Incorporated and its Keyspan division. The Keyspan division developed and marketed to the retail channel several lines of computer peripheral and communications devices such as USB adapters, computer remote control devices, USB and FireWire add on cards, and related technology. I personally designed and developed core technology for the Keyspan business, resulting in an increase in sales from less than \$1MM in 1997 to \$13MM in 1999.

7. From 2007 to the present, I have been president of Bramson Welch & Associates, Inc., an Engineering Services consultancy specializing in embedded systems, USB, Bluetooth, data communications, mobile devices, iPhone accessories, and litigation services, including data analysis and expert witness work. I serve as System Architect and Project Strategist on all Bramson Welch projects. I frequently

work with multiple client groups to coordinate design and architecture across many different technical and organizational domains.

8. I have over twenty-five years of significant experience specifically with the development of USB peripherals, adapters, hosts, and special purpose devices. For example, I was responsible for the design and development of the Keyspan USB/serial adapter, the first working serial adapter for the Apple iMac in the mid-1990s, which is still shipping today. Also, for example, I was responsible for the design and development of Keyspan's network-attached host adapter, a device with an ethernet network connection and four USB Host ports. In other examples, while at Keyspan and later at Bramson Welch, I was responsible for the design and development of dozens of USB peripheral devices, including class device interface (i.e., storage, HID, and communication adapters), and vendor-specific devices that do not fit any of the existing USB classes. I am also a senior member of the Institute of the Electrical and Electronics Engineers association (IEEE).

9. I also have specific experience with USB entities that can function either as a USB Host or as a USB Device, including several prominent smartphone platforms, where role detection and role switching are important features.

10. While many of my projects have been USB focused, I also have experience with other communication protocols, such as HDMI and Power Over Ethernet ("PoE"), among others. For example, I worked on a design study with

HDMI to evaluate existing USB adapter technology to assess its applicability. I have also worked on a number of smart phone USB/Ethernet adapters, including several with PoE technology.

11. I have significant experience providing expert witness services in the areas of electrical and computer engineering, and in the course of this work and my own research and patenting activities, I have gained experience studying and analyzing patents and patent claims from the perspective of a person skilled in the art.

12. My curriculum vitae contains further details regarding my experience, education, publications, and other qualifications which allow me to render expert opinions in connection with this proceeding.

III. Documents and Materials Considered

13. In forming my opinions, in addition to my knowledge, education, training, and experience, I have considered the materials cited in this Declaration and the documents and things that I have obtained, or that have been provided to me, as listed in the Table of Exhibits.

14. I reserve the right to supplement or amend this Declaration if additional information that affects my opinions becomes available.

IV. Relevant Legal Principles

15. I am not an attorney, and I offer no opinions on the law. Counsel has informed me of legal standards that apply to the issue of patent validity. I have applied these standards in arriving at my conclusions.

16. I understand that in an *inter partes* review the petitioner has the burden of proving a proposition of unpatentability by a preponderance of the evidence. I understand this standard is different from the standard that applies in a district court, where I understand a challenger bears the burden of proving invalidity by clear and convincing evidence.

17. I understand that a patent claim is invalid based on anticipation if a single prior art reference discloses all of the features of that claim in a way that enables one of ordinary skill in the art to make and use the invention. Each of the claim features may be expressly or inherently present in the prior art reference. I understand that if the prior art necessarily functions in accordance with, or includes a claim's feature, then that prior art inherently discloses that feature.

18. I understand that a patent may not be valid even though the invention is not identically disclosed or described in the prior art if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art in the relevant subject matter at the time the invention was made.

19. I understand that obviousness must be tested as of the time the invention was made. I understand that the test for obviousness is what the combined teachings of the prior art references would have suggested, disclosed, or taught to one of ordinary skill in the art.

20. I understand that, to determine if a claim is obvious, the following factors should be considered: (1) the level of ordinary skill in the art at the time the invention was made; (2) the scope and content of the prior art; (3) the differences between the claimed invention and the prior art; and (4) secondary considerations, including evidence of commercial success, long-felt but unsolved need, unsuccessful attempts by others, copying of the claimed invention, unexpected and superior results, acceptance and praise by others, independent invention by others, and the like.

21. For example, I understand that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I also understand that an obviousness analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim because a court can take account of the inferences and/or creative steps that a person of ordinary skill in the art would employ.

22. I understand that the following rationales may be used to determine whether a piece of prior art can be combined with other prior art or with other information within the knowledge of one of ordinary skill in the art:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Predictable use or combination of prior art elements according to their established functions;
- Use of known techniques to improve similar devices (methods, or products) in the same way;
- Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- “Obvious to try” - choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; or
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

23. I understand that when a work is available in one field of endeavor, design incentives and/or other market forces, for example, can prompt variations of it, either in the same field or a different one. Moreover, if a person of ordinary skill can implement a predictable variation, I understand this likely bars its patentability.

24. I understand that another factor to be considered is common sense. For example, I understand that common sense teaches that familiar items may have obvious uses beyond their primary purposes, and, in many cases, a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.

25. I understand that the Supreme Court articulated additional guidance for obviousness in its *KSR* decision. My understanding is that the Supreme Court said that technical people of ordinary skill look for guidance in other solutions to problems of a similar nature, and that the obviousness inquiry must track reality, and not legal fictions. I have relied on these understandings in expressing the opinions set forth below.

26. I understand that, for purposes of my analysis in this *inter partes* review proceeding, the terms appearing in the patent claims should be interpreted according to their “ordinary and customary meaning.” In determining the ordinary and customary meaning, the words of a claim are first given their plain meaning that those words would have had to a person of ordinary skill in the art (“POSITA”). I understand that the structure of the claims, the specification, and the file history also may be used to better construe a claim insofar as the plain meaning of the claims cannot be understood. Moreover, treatises and dictionaries may be used, albeit under

limited circumstances, to determine the meaning attributed by a POSITA to a claim term at the time of filing. I have followed this approach in my analysis.

27. I also understand that the words of the claims should be interpreted as they would have been interpreted by a POSITA at the time the alleged invention was made (not today). I have been asked to use the priority date of March 31, 2011.

V. Person of Ordinary Skill in the Art

28. In order to determine the characteristics of a POSITA of the '265 Patent, I have used March 31, 2011 as the relevant time frame. My understanding is that this is the alleged earliest priority date of the application that resulted in the '265 Patent. For purposes of this Declaration, any reference to the priority date of the '265 Patent is intended to refer to this March 31, 2011 date.

29. In determining the characteristics of a person of ordinary skill in the art for the '265 Patent, I have considered the state of the art of audio/visual data communications devices and interfaces at that time, the types of problems encountered with providing for bidirectional data and power in such interfaces, and the solutions that then existed. I have also considered the then-existing technology for bidirectional communication of audio/visual data, including the sophistication of the technology involved, and the education and experience of those working in the field at that time. I have also considered my personal knowledge and experience in the field at that time, including those I worked and interacted with regarding

audio/visual communication systems. I have also considered the knowledge, education, and experience of those in academia and industry at that time that were working, innovating, or performing research in the field of audio/visual communications.

30. It is my opinion that a POSITA for the '265 Patent at the time of this filing date would have had a Bachelor's degree in Electrical Engineering, Computer Engineering, or an equivalent field, and at least three years of academic or industry experience with data communications systems or interfaces, including at least some experience with serial or display data communications systems or interfaces.

31. Given this background, a POSITA would have been familiar with at least the HDMI industry standard and knowledgeable about the design and operation of standardized audio/visual interfaces and systems.

32. Based on my background and qualifications, I am currently and was as of the priority date of the '265 Patent at least a POSITA in the subject matter of the '265 Patent.

VI. '265 Patent

A. Overview

33. U.S. Patent No. 9,232,265 to Maxwell et al. is entitled "Method, Apparatus, and System for Transitioning an Audio/Video Device Between a Source Mode and a Sink Mode" and was issued on January 5, 2016.

34. The '265 Patent is directed to techniques and mechanisms for controlling an audio-video (“AV”) device to operate as an AV source or an AV sink at different times. *Id.* at 2:21-31, 1:19-23, abstract. The '265 Patent explains that conventional AV devices include hardware, such as a High-Definition Multimedia Interface (HDMI) connector, for coupling to another device to exchange AV information. *Id.* at 1:32-35. Some conventional AV devices, such as camcorders, cameras, computers, smart phones, video game consoles, DVD players, DVRs, and set-top boxes, operate as sources and send AV information to other devices via the connector. *Id.* at 1:32-43. The '265 Patent further explains that other conventional AV devices, such as televisions, monitors, displays, computers, and projectors, operate as sinks to receive AV information via the connector. *Id.* at 1:44-45. The claimed AV device includes logic to selectively operate the device as an AV source *or* as an AV sink, which purports to improve upon the prior art by reducing the area taken up by multiple AV connectors, accommodating “the increasing variety of combinations of AV devices which may be coupled to one another to exchange AV information,” and preventing hardware damage caused by the connection of two AV source devices. *Id.* at 2:21-31, 1:50-59, 3:64-4:15.

35. As illustrated in Fig. 1 below, the claimed system 100 for exchanging AV information includes a first AV device 110 with AV logic 112 to implement AV communications between first device 110 and one or more other devices, such as

second device 120 or third device 130. *Id.* at 3:23-27, Fig. 1. First AV device 110 includes functionality of a conventional AV source device and/or a conventional AV sink device. *Id.* at 3:34-36. More particularly, first device 110 may be capable of receiving data and/or power as an AV sink or providing data and/or power as an AV source. *Id.* at 5:46-57. First AV device 110 may also include a connector 114 with a plurality of channels which are compatible with an AV standard, such as an HDMI standard. *Id.* at 3:43-49. The connector 114 may couple first device 110 via interconnect 122 to second device 120 for an exchange of information from second device 120 to first device 110, or from first device 110 to second device 120. *Id.* at 3:50-63. To that end, second device 120 may also include logic to implement both AV source functionality and AV sink functionality. *Id.*

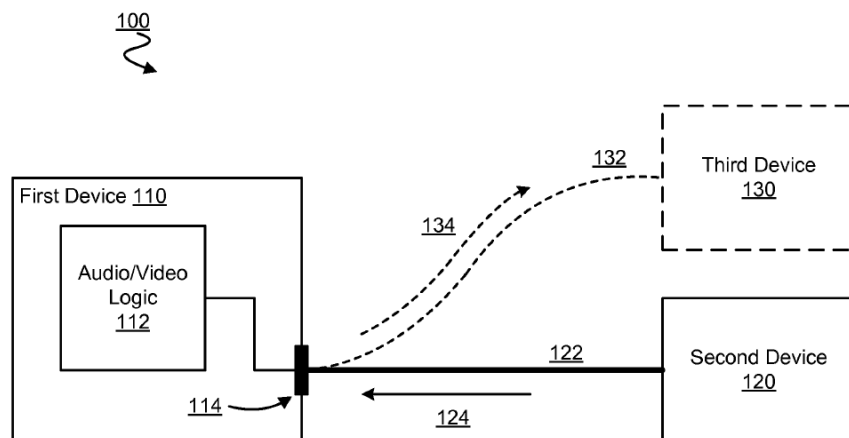


FIG. 1

Id. at Fig. 1.

36. Fig. 5, reproduced below, illustrates the AV logic of the first AV device in further detail. *Id.* at 10:29-34, Fig. 5. AV logic may include control logic 505 to “receive information indicating a presence or absence of one or more characteristics regarding connectivity” of the first device with a second device via HDMI connector 510, and “variously place communication logic 580...at different times in different...operation modes,” including sink and source modes. *Id.* at 10:40-45, 10:63-11:6. AV logic may also include detection logic 520 to detect a supply voltage output, a signal line termination, extended display identification data (EDID), digital data functionality, a clock signal, or the like. *Id.* at 10:46-53. Messages from detection logic 520 may indicate to control logic whether and/or how the system is to transition between operating modes. *Id.* at 10:63-11:6. Control logic may then configure a switch 530 of communication logic 580 to switch between transmit logic 540 for source mode operation and receive logic 550 for sink mode operation. *Id.* at 11:7-13.

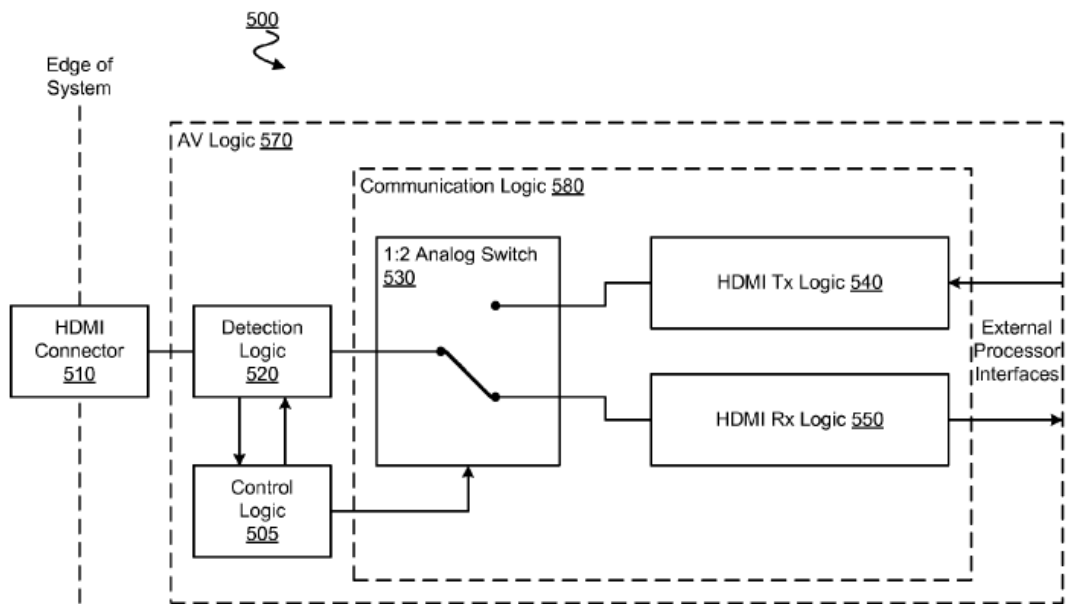


FIG. 5

Id. at Fig. 5.

37. The '265 Patent explains that connecting two AV source devices can risk damage to the devices' transmission hardware. *Id.* at 3:64-4:11. For example, the two AV sources may simultaneously attempt to drive power in opposite directions on the power channel of the connector or may attempt to drive data signals in opposite directions on the same data channel of the connector. *Id.* The claimed invention purportedly addresses this problem by providing a control mechanism to "prevent one or more aspects of AV Source functionality from being provided during operation of first device 110." *Id.* at 4:12-15. Specifically, the AV logic 112 may be prevented from operating in AV source operation mode—in which AV logic 112 is configured to provide a supply voltage, a digital data signal, or a particular amount

of impedance on a channel of connector 114 (*id.* at 4:15-26)—until “certain connectivity conditions are subsequently identified” (*id.* at 7:57-67).

38. In operation, the AV logic 112 selects an operation mode based on an event at the first device 110—for example, a power-up event, a power-down event, or a reset event. *Id.* at 4:27-30. The AV logic may also transition between modes based on whether the device 110 detects a particular characteristic of the second device 120 (or the absence thereof), which indicates whether the second device 120 is a source or a sink. *Id.* at 34-38. For example, a +5V supply voltage may indicate that the second device 120 is a source in a system where the connector 114 is “compatible with an interface standard which stipulates that an AV Source is to provide a supply voltage to its corresponding AV Sink—e.g. the +5V output to be provided from Source to Sink according to HDMI, as on pin 18 of a 19-pin HDMI connector.” *Id.* at 4:41-46. Similarly, a clock signal may also indicate that the second device 120 is a source, in a system with a connector 114 that is “compatible with an interface standard which stipulates that an AV Source is to provide a clock signal to an AV Sink—e.g. the DDC_SCL signal to be provided from Source to Sink according to HDMI, as on pin 15 of a 19-pin HDMI connector.” *Id.* at 4:55-62. As another example, such a characteristic may include whether a particular amount of impedance is being provided by second device 120, in a system where connector 114 is “compatible with an interface standard which stipulates that a particular pull-

up impedance is to be implemented at an AV Sink—e.g. a 47 kQ pull-up resistance which HDMI requires be provided at an AV Sink for a SDA line (e.g. pin 16 of a 19-pin HDMI connector).” *Id.* at 4:63-5:4.

39. In response to a power up, power down, or reset event, the AV logic 112 may automatically place the device into “a default operation mode which prevents the second supply voltage from being provided...at the channel of the connector,” as would occur if the device were in source mode. *Id.* at 5:59-62, 6:25-32. The default operation mode may similarly prevent a first total amount of impedance for a data channel of the connector from being provided by the device, as would also occur if the device were in source mode. *Id.* at 6:33-39. In one embodiment, the default operation mode is an AV sink operation mode *Id.* at 6:32-33, Fig. 2A.

40. In response to detecting that a second connected device is a source (i.e., is providing power, a clock signal, or a certain level of impedance), the AV logic 112 may “automatically place the...AV device into some first operation mode which prevents a providing of the second supply voltage,” as would occur if the first device were in source mode. *Id.* at 6:52-7:8, Fig. 2B. This limits the possibility of circuit damage due to conflicting output signals from two coupled AV devices which are each attempting to operate as an AV source. *Id.* at 7:11-14.

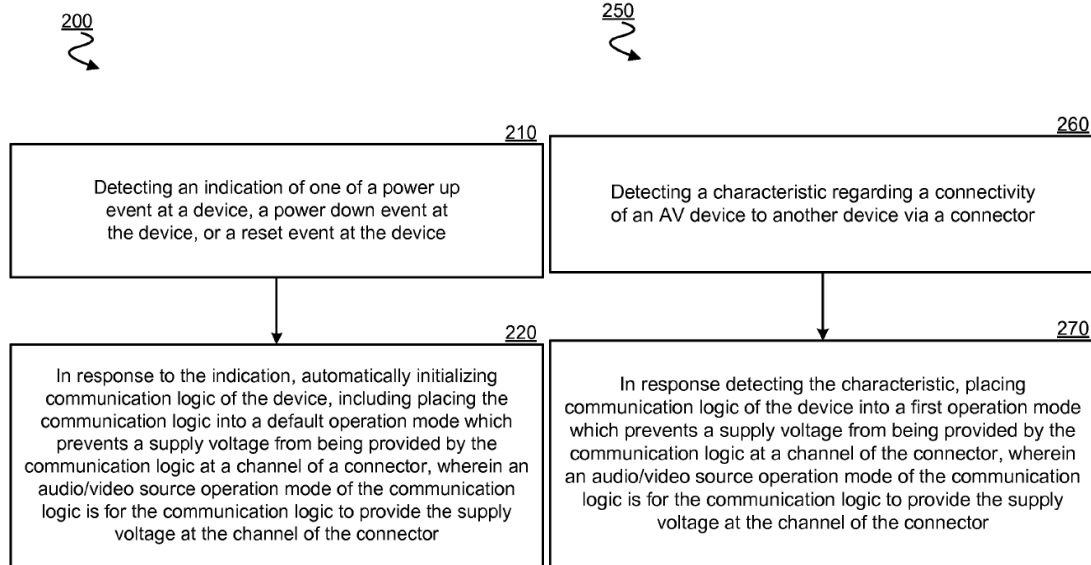


FIG. 2A

FIG. 2B

Id. at Figs. 2A, 2B.

41. The device may transition between sink and source mode depending on connectivity characteristics detected at the connector. *Id.* at 8:32-35. For example, a first device may initialize to sink mode by default in response to a reset, power-on, or power-off event. *Id.* at 8:65-67. The first device may then periodically test for some indication that a second device is connected and determine whether the second device is a source or sink. *Id.* at 9:13-19. As one example, the first device may test whether a +5V HDMI supply voltage is being provided by the second device, which indicates that the second device is operating as a source. *Id.* at 9:15-19. If the second device is a source, the first device may assert a hot plug detect (HPD) signal and commence operation in sink mode. *Id.* at 9:19-23. The first device may occasionally test whether the +5V voltage continues to be provided. *Id.* at 9:23-26. Upon detecting

that the voltage is no longer provided, the first device may disable its HPD signal, its DDC output, and/or “any other AV Sink functionality that is not currently being used.” *Id.* at 9:26-30, Fig. 4A.

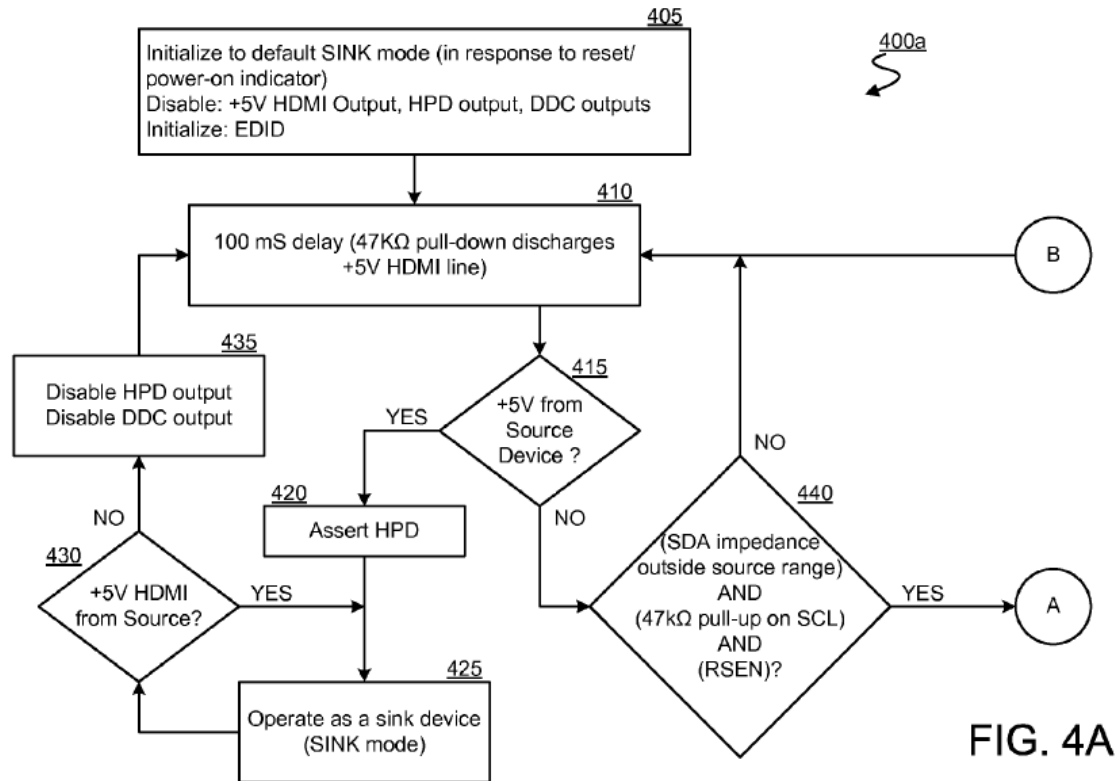
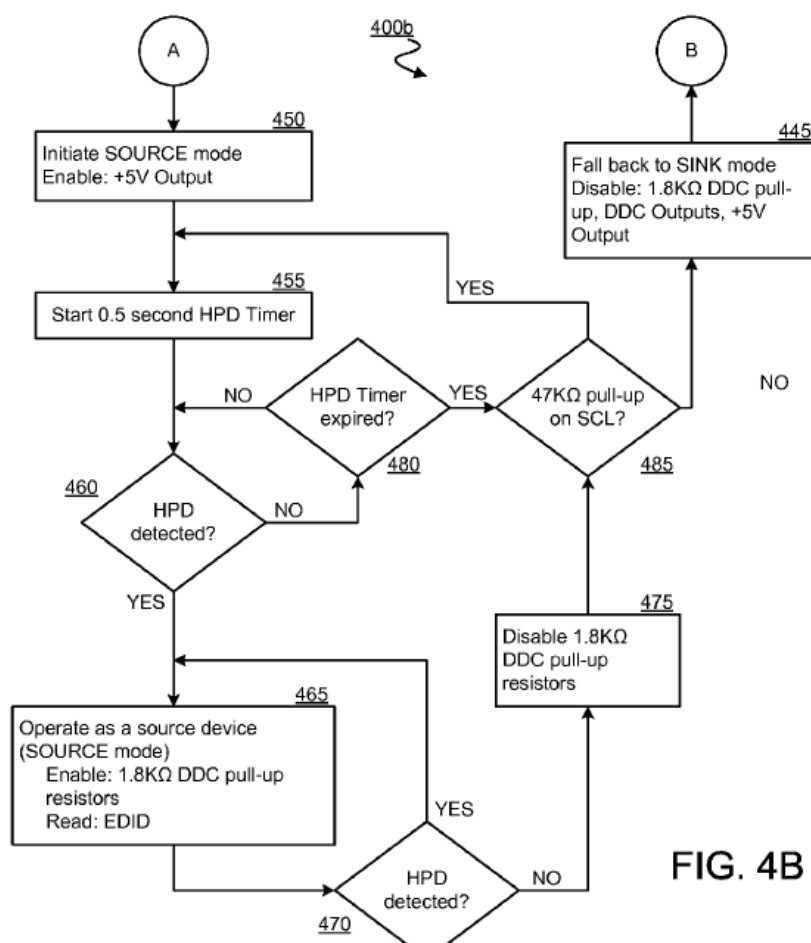


FIG. 4A

Id. at Fig. 4A.

42. If the +5V supply voltage is not detected, then the first device may look for the presence of a coupled device which may be operating as a sink. *Id.* at 9:33-36. For example, the first device may confirm that there is a 47 kΩ pull-up resistor on the DDC SCL clock channel (as required by the HDMI specification for sinks), that an impedance on the data channel is not in the HDMI specified source range of 1.51 kΩ to 2.0 kΩ, and that a receiver sense input (RSEN) signal indicates that one

or more differential pairs of the connector are provided with terminators at some coupled device. *Id.* at 9:36-44. If a sink device is detected, then the first device may transition into source mode—for example, by enabling a +5V supply voltage. *Id.* at 9:49-53, Fig. 4B. Once the first device determines that a sink is no longer connected, it transitions back to sink mode—for example, by disabling the +5V supply voltage, DDC outputs, and 1.8K pull-up resistors. *Id.* at 10:4-9.



Id. at Fig. 4B.

B. Prosecution History

43. On March 29, 2012, the '265 Patent was filed as Application No. 13/434,273 (the "'273 Application") entitled "Method, Apparatus and System for Transitioning an Audio/Video Device Between a Source Mode and a Sink Mode." EX1002 at 475. The '273 Application claims priority to provisional patent application No. 61/470,431, filed on March 31, 2011, and originally listed 20 claims. EX1002 at 459-64, 372.

44. During prosecution of the '273 Application, the PTO issued one non-final rejection on September 10, 2014 and a final rejection on May 28, 2015, before allowing the claims on September 25, 2015. EX1002 at 359-70, 311-22, 269-77. In the September 10, 2014 office action, the Examiner rejected claims 1-2, 4-10, and 12-20 as anticipated by U.S. Patent No. 7,995,043 to Noorbakhsh et al. (Noorbakhsh), and claims 3 and 11 as obvious over Noorbakhsh in view of U.S. Patent No. 7,889,201 to Yato (Yato). *Id.* at 359-70. In response, the Applicant canceled claims 2, 6, 8, 10, 14, 16, 18, and 20 and amended claims 1, 4, 5, 7, 9, 12, 13, 15, 17, and 19. *Id.* at 345. To overcome the prior art, the Applicant added the following limitations to claim 1, and to claims 9 and 15 in similar form:

determining whether a first supply voltage is provided at a channel of a connector, the connector coupling the first AV device and the second AV device;

in response to determining that the first supply voltage is provided at the channel of the connector, configuring communication logic of the

first AV device to operate the first AV device in an AV sink operation mode, wherein the first AV device receives AV data provided to the first AV device via the connector and receives power from the first supply voltage provided to the first AV device at the channel of the connector in the AV sink operation mode, the AV sink operation mode being a default mode of operation; and

in response to determining that the first supply voltage is not provided at the channel of the connector, configuring the communication logic of the first AV device to transition the first AV device from the AV sink operation mode to an AV source operation mode, the first AV device sends AV data via the connector and provides a second supply voltage at the channel of the connector in the AV source operation mode.

Id. at 345-46.

45. The Applicant explained that, as purportedly agreed during an interview with the Examiner, Noorbakhsh fails to disclose at least the last claim feature recited above, beginning with “in response to determining that the first supply voltage is not provided.” *Id.* at 345-46.

46. In the May 28, 2015 office action, the Examiner rejected claims 1, 3, 5, 7, 9, 11-13, 15, and 17 as anticipated by U.S. Patent App. Pub. No 2009/0174817 A1 to Sato et al. (Sato) and claim 4 as obvious over Sato in view of Noorbakhsh. *Id.* at 311-22. In response, the Applicant amended claims 1, 9, 15, and 19, and added new claims 21-26 dependent on claims 1, 9, or 15. *Id.* at 303. To overcome Sato, the Applicant added the following limitation to claim 1, and in similar form to claims 9 and 15:

initializing a first audio/video (AV) device to operate in a default AV sink operation mode in response to a power-on-reset or powering up of the first AV device;

Id. at 303-04.

47. The Applicant explained that, as purportedly agreed during an interview with the Examiner, Sato fails to disclose the amended claim elements. *Id.* at 304. The Applicant further explained that Noorbakhsh did not cure the deficiencies of Sato, because (a) while Noorbakhsh teaches an ON mode and an OFF mode, the ON mode is not the claimed “AV source operation mode” at least because the device does not “provide a second supply voltage”; and (b) Noorbakhsh fails to disclose transitioning from the AV sink mode to an AV source mode in response to determining that the first supply voltage is not provided at the channel of the connector because Noorbakhsh teaches that the device transitions from OFF to ON when its internal power regulator is turned on, not as a result of checking for a supply voltage provided from an external source. *Id.* at 304-05.

48. The Examiner allowed claims 1, 3-5, 7, 9, 11-13, 15, 17, 19, and 21-26 on September 25, 2015 because the above “initializing” limitation in combination with the other claim elements was not taught by the prior art of record. *Id.* at 273-77. However, this claim limitation is disclosed by Iwamoto, Hsieh, Knight, and HDMI 1.3a.

C. Summary of the Prosecution of EP12762781.8

49. The '265 Patent is related to European Patent Application No. EP12762781.8 (the "'781 Application"), which was filed on March 30, 2012 and granted as EP2692118 B1 (the "'118 Patent") on May 8, 2019. EX1011 at 1. A comparison of claim 8 of the '265 Patent and claim 5 of the '118 Patent is below. EX1012 at 176-80, 150-52.

'265 Patent	'118 Patent
Claim 8	Claim 5
An audio/video (AV) device comprising:	An audio/video (AV) device (110) comprising:
communication logic to couple to a connector, the communication logic including circuitry configured to implement:	communication logic (580) to couple to a wired connector (114, 510), the communication logic (580) including circuitry to implement:
an AV sink operation mode for the communication logic to receive AV data provided to the AV device at the connector and to receive power from a first supply voltage provided to the AV device via a channel of the connector, the AV sink operation mode being a default mode of operation for the AV device, and	an AV sink operation mode for the communication logic (580) to receive AV data provided to the AV device (110) at the wired connector (114, 510) and to receive power from a supply voltage provided to the AV device (110) via a power pin of the wired connector (114, 510), and
an AV source operation mode for the communication logic to send AV data from the AV device via the connector and to provide a second supply voltage at the channel of the connector; and	an AV source operation mode for the communication logic (580) to send AV data from the AV device (110) via the wired connector (114, 510) and to provide a supply voltage at the power pin of the wired connector (114, 510); and

control logic including circuitry to configure the communication logic to initialize the AV device to operate in the default AV sink operation mode in response to a power-on-reset or powering up of the AV device,	control logic (505) including circuitry to initialize the communication logic (580) to operate the AV device (110) in the AV sink operation mode, wherein the AV sink mode of operation includes that the first AV device does not supply power to a power pin (Channel 18 for an HDMI connector), a pull up resistor is disabled for a Display Data Channel (DOC) pin (Channel 15 for an HDMI connector) and an extended display identification data (EDID) functionality is initialized; after the initializing, to pull down, by the AV device (110) the power output pin through a pull down resistor;
to continue operating the AV device in the AV sink operation mode in response to determining that the first supply voltage is provided at the channel of the connector, and	in response to determining that the supply voltage is provided at the power pin of the wired connector (114, 510) and continuing to operate the AV device (110) in the AV sink operation mode, and asserting a voltage on a hot plug detect pin (Channel 19 of connector 510) of the wired connector (114, 510), periodically checking the power pin for presence of the supply voltage at the power pin, and de-asserting the voltage on the hot plug detect pin in response to absence of the supply voltage at the power pin; and

to configure the communication logic to transition the AV device from the AV sink operation mode to the AV source operation mode in response to determining that the first supply voltage is not provided at the channel of the connector.	to initialize the communication logic (580) to transition the AV device (110) from the AV sink operation mode to the AV source operation mode in response to determining that the supply voltage is not provided at the power pin of the wired connector (114,510), to enable the pull-up resistor for the DOC pin (Channel 15), to set a timer for a pre-determined limit, and
	to wait for detection of a voltage at hot plug detect pin, and if the voltage is not detected at the hot plug detect pin before expiration of the timer, to transit the AV device (110) from the AV source operation mode to the AV sink operation mode.

50. Granted claim 5 of the '118 Patent is the result of several amendments to original claim 9. On August 13, 2014, the European Patent Office found that the subject matter of claim 9 of the '781 Application was not new in view of Hsieh (referred to as D1). EX1012 at 167-70. On February 16, 2015, the Applicant amended claim 9 by adding the following limitation and renumbered it as claim 6.

transition[ing] the AV device from the AV sink operation mode to the AV source operation mode in response to determining that the first supply voltage is not provided at the channel of the connector

Id. at 159-63, 155.

51. The Applicant argued that Hsieh “discloses a transceiver that supports bi-directional communication by configuring the transceiver in either a source mode or a sink mode,” but fails to disclose the above limitation. *Id.* at 161.

52. On November 23, 2016, the European Patent Office found that the subject matter of claim 6 of the '781 Application was not new in view of Iwamoto (referred to as D6). *Id.* at 138-41. To overcome Iwamoto, the Applicant amended previous claim 6 (renumbered as claim 5) by adding limitations (emphasized in the chart above) concerning a pull up resistor for a Display Data Channel (DDC), extended display identification data (EDID) functionality, a pull down resistor for the power output pin, and a hot plug detect pin. *Id.* at 103-04, 112-13. The European Patent Office granted the patent based on these amendments on April 11, 2019. *Id.* at 3-4. These limitations are not recited in the claims of the '265 Patent, and Iwamoto was never considered by the USPTO.

D. Summary of the Prosecution of JP2014502838 A

53. The '265 Patent is also related to Japanese Patent Application No. JP 2014-502838 A (the "'838 Application"), which was filed on March 30, 2012 and published as JP 2014-509821 A (the "'821 Publication") on April 21, 2014. EX1013 at 1. The pending claims of the '838 Application were similar to the granted claims of the '265 Patent. EX1014 at 105.

54. On March 17, 2016, the Japanese Patent Office rejected all pending claims of the '838 Application, finding that the subject-matter of pending claims 1-3, 6-8, and 10 of the '838 Application were not new in view of Iwamoto (referred to

as Cited Document 1). EX1014 at 108-110. The Applicant subsequently abandoned the application without responding to the office action.

55. In short, both the EPO and the JPO have found that the scope of the claims as issued in the '265 Patent should be not patentable in light of Iwamoto, and the original applicant of the corresponding European and Japanese applications did not argue otherwise.

VII. Technology Background

56. The technology of the '265 Patent relates to dual role data communication devices that can function as a source/host or sink/peripheral, and methods for negotiating the role of a dual role device. As of the filing date of the '265 Patent, dual role data communication devices, such as USB “On-The-Go” (“USB OTG”) dual role devices, were well known. EX1016 at 9, 11. While the earliest versions of USB did not standardize the use of dual-role devices, the USB-IF became interested in standardizing dual-role operation and developed the USB OTG supplement in the early 2000s (version 1.0 published in December 2001 and version 2.0 published in May 2009). The OTG supplement defined how devices could connect and negotiate their individual roles between USB Host and USB Peripheral. USB OTG dual role devices were designed with the recognition that communications traditionally could only take place between a host and a peripheral, but many portable devices “would benefit from being able to communicate to each

other.” *Id.* at 9. Thus, to provide more flexibility when connecting various peripheral devices, USB OTG devices with both host and peripheral functionality were designed to operate in either role. *Id.* at 11.

57. USB OTG devices that can function as either a host or a peripheral are provided with a host negotiation protocol, which “allows the Host function to be transferred between two directly connected dual-role devices.” *Id.* at 14. During operation, a dual role USB OTG device can default to being either Host or Peripheral, and “the role of the Host can be transferred back and forth between the...[devices] any number of times, using the Host negotiation Protocol.” *Id.* at 45, 58. In a USB OTG device, the host negotiation process is accomplished through the use of certain in-band USB Control Messages and pull-up and pull-down resistors on the D+ line. *Id.* at 58-59.

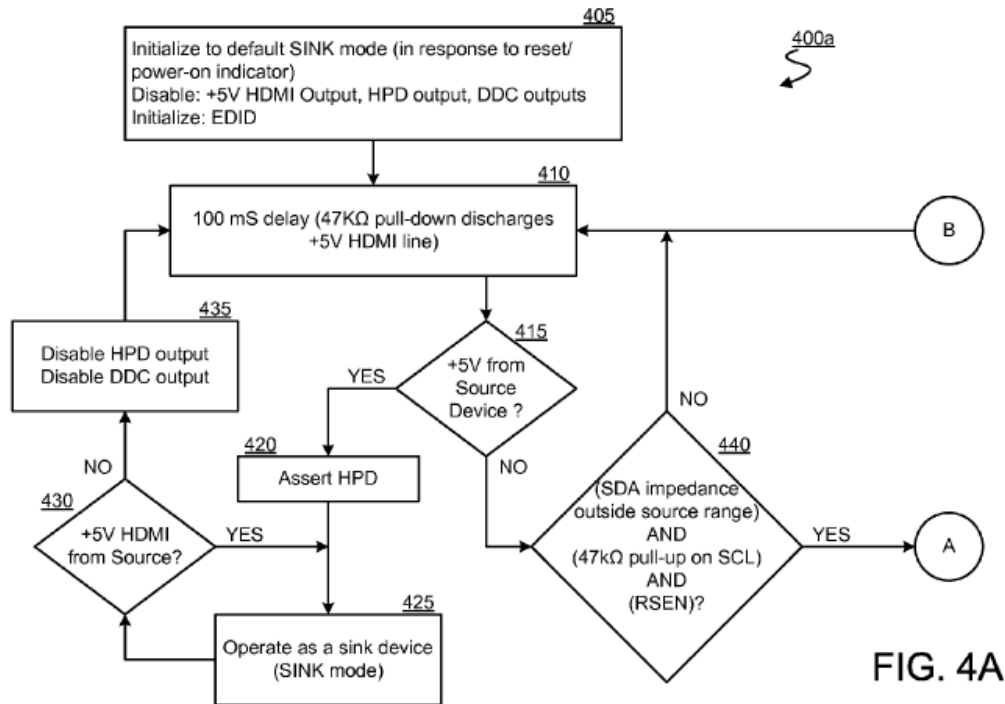
58. Well before March 31, 2011 (the Priority Date of the ’265 Patent), dual-role USB devices became ubiquitous. EX1017 at Abstract (discussing “dual-role devices (OTG devices)”; EX1018 at [0007], [0052] (discussing “dual role peripheral devices”); EX1019 at [0040] (discussing OTG or dual-role devices). Iwamoto and Hsieh, which are directed to *HDMI* dual-role devices (rather than *USB* dual-role devices), were published against this backdrop.

VIII. Claim Construction

59. I have interpreted the terms of the '265 Patent according to their plain meaning. In interpreting the terms, I have carefully considered and applied the claim construction standards referred to in Section IV above.

60. With respect to “AV sink operation mode,” as recited in independent claims 1, 8, and 14, a POSITA would have understood that “AV sink operation mode” is a mode with certain source functionality disabled. The '265 Patent explains that connecting two source devices to each other “can risk damage to transmission hardware” because “the two devices may attempt to drive power in opposite directions in the same power supply voltage channel of a connector,” or may similarly attempt to drive data signals, “hot plug detect signals, clock signals and/or the like” against each other on the same connector channel. EX1001 at 4:1-11. Thus, in order to protect the connected devices’ hardware, the claimed sink mode “prevent[s] one or more aspects of AV Source functionality from being provided during operation.” *Id.* at 4:12-15; *see also* abstract (“control logic initializes the communication logic of the AV device into a default mode which prevents operation of the communication logic as an AV source”). For example, the sink mode may prevent the device from providing supply voltage. *Id.* at 6:25-32. A POSITA would thus have understood that “AV sink operation mode” is a mode in which certain source functionality is disabled to prevent accidental hardware damage.

61. The '265 Patent further explains that certain AV sink functionalities are *also* disabled in a first phase of the “AV sink operation mode.” For example, the '265 Patent teaches that the claimed device may initialize to sink mode in response to a reset, power-on, or power-off event. *Id.* at 8:65-67. In this stage of sink mode, certain source functionality is disabled (i.e., +5V HDMI output), and certain sink functionality is disabled (i.e., HPD output, DDC output). *Id.* at Fig. 4A. The device may then periodically test for some indication that a second device is connected and determine whether the second device is a source or sink. *Id.* at 9:13-19. If the second device is a source, the first device may assert a hot plug detect (HPD) signal and commence operation in a second stage of sink mode. *Id.* at 9:19-23. Upon detecting that the source is no longer connected, the device may disable its HPD signal, its DDC output, and/or “any other AV Sink functionality that is not currently being used” and reenter the first phase of default sink mode. *Id.* at 9:26-30, Fig. 4A. A POSITA would thus have further understood that full AV sink functionality does not need to be enabled in all phases of the “AV sink operation mode.” *Id.* at 9:26-30, Fig. 4A.



Id. at Fig. 4A.

IX. Summary of Opinions

62. In my opinion, JP 2009-60204 A to Iwamoto (“Iwamoto”), entitled “Source/Sink Dual-Purpose Device,” either alone or in combination with U.S. Pat. App. Pub. No. 2009/0046690 A1 to Hsieh (“Hsieh”), U.S. Pat. App. Pub. No. 2008/0028237 A1 to Knight (“Knight”), and/or High-Definition Multimedia Interface V1.3a (“HDMI 1.3a”), renders obvious claims 1, 4-5, 8, 11, and 14-16 of the ’265 Patent.

63. A table of the grounds is provided below for ease of reference:

Grounds		Claims
1	35 U.S.C. §103 over Iwamoto	1, 4-5, 8, 11, and 14-16

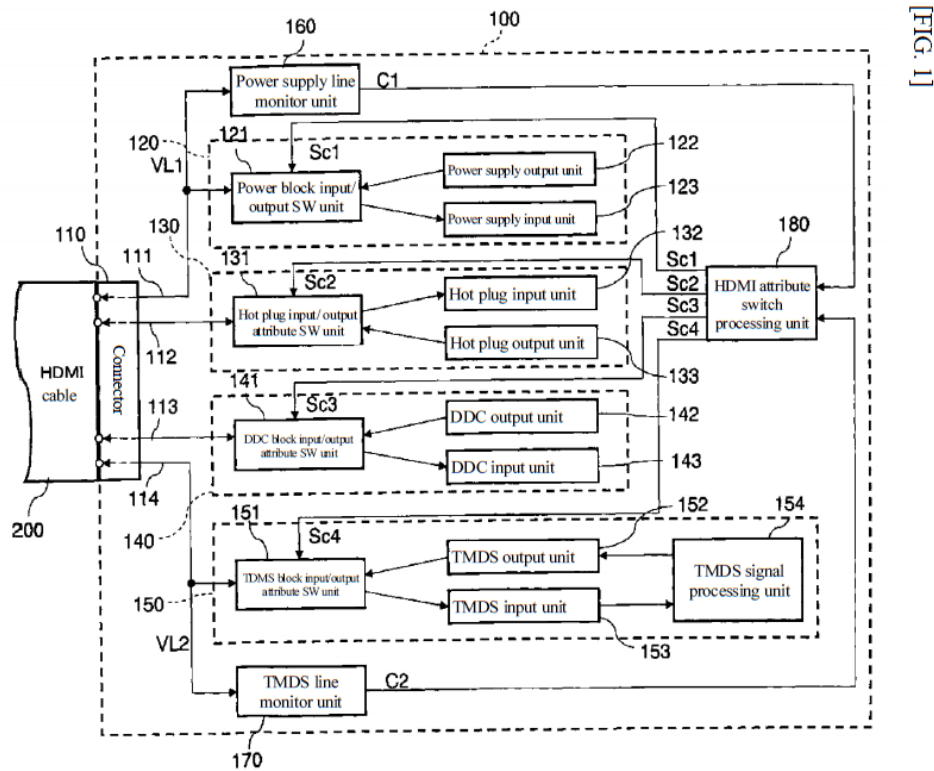
Grounds		Claims
2	35 U.S.C. §103 over Iwamoto in combination with Hsieh	1, 4-5, 8, 11, and 14-16
3	35 U.S.C. §103 over Iwamoto in combination with Knight	1, 4-5, 8, 11, and 14-16
4	35 U.S.C. §103 over Hsieh in combination with Iwamoto	1, 4-5, 8, 11, and 14-16
5-8	35 U.S.C. §103 over any of Grounds 1-4 in further combination with HDMI 1.3a	1, 4-5, 8, 11, and 14-16

A. Overview of Iwamoto (EX1005, translation at EX1006)

64. JP 2009-60204 A (“Iwamoto”) was filed as Japanese application No. JP 2007-223646 on August 30, 2007 and published on March 19, 2009. EX1005 at 1; EX1006 at 1.¹

65. Iwamoto teaches a “source/sink dual-purpose device conforming to the HDMI standard” that can function as a source device or a sink device. EX1006 at [0016]-[0017], Fig. 1. The dual-purpose device includes a first voltage level monitor for detecting the voltage level of the power line of an HDMI cable (VL1), and a second voltage level monitor for detecting the voltage level of a TMDS_CLK line of the HDMI cable (VL2). *Id.* at [0016]. A POSITA would have understood the “voltage level of a TMDS_CLK line” to be the 3.3 V that results from the sink termination. *See infra* ¶ 78. Iwamoto teaches that the dual-purpose device uses these measurements to determine whether a connected device is a source or a sink, and to “automatically switch[] its own functions” accordingly. *Id.* at [0016], [0026].

¹ Hereinafter, citations to Iwamoto refer to its English translation (EX1006).



[FIG. 1]

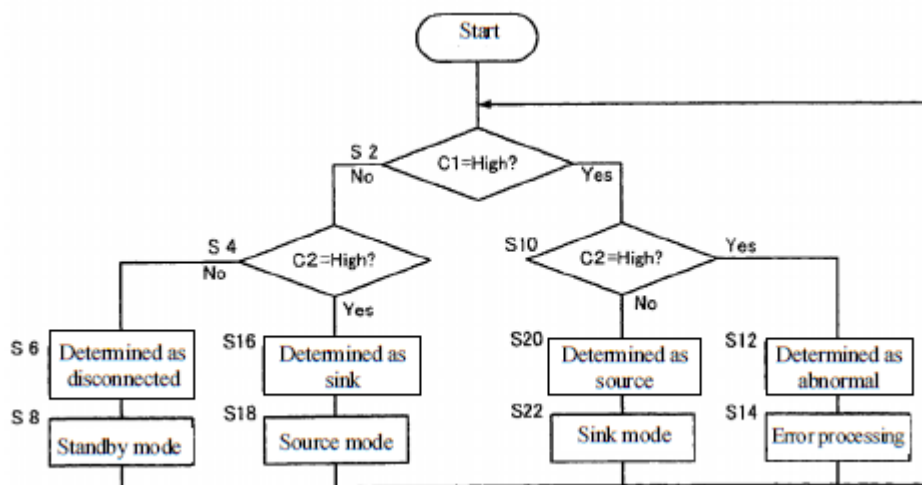
Id. at Fig. 1.

66. More specifically, Iwamoto teaches that the dual-purpose device has several modes depending on the two voltage levels. When VL1 and VL2 are low, the dual-purpose device determines that it is not connected to a second device and operates in standby mode. *Id.* at [0043]-[0044], [0072]-[0073], Fig. 3. When VL1 is high (5 V) and VL2 is low, the dual-purpose device determines that the connected device is a source and operates in sink mode. *Id.* at [0043]-[0045], [0075], [0076], Fig. 3. When VL1 is low and VL2 is high (3.3 V), the dual-purpose device determines that the connected device is a sink and operates in source mode. *Id.* Thus, “the source/sink dual-purpose device can function as the source device or the sink

device according to...whether [the connected device] is the sink device or the source device, without a switching operation of the user.” Iwamoto at [0027], Figs. 2, 3.

[FIG. 2]

C1	C2	J	M	Sc	
Power line level	TMDS CLK line level	External device function determination	Operation mode determination	Control Signal	
Low	Low	Disconnected	Standby	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
High	High	Error	Shunt	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
Low	High	Sink	Source	Sc1	Power supply output unit
				Sc2	Hot plug input unit
				Sc3	DCC output unit
				Sc4	TMDS output unit
High	Low	Source	Sink	Sc1	Power supply input unit
				Sc2	Hot plug output unit
				Sc3	DDC input unit
				Sc4	TMDS input unit

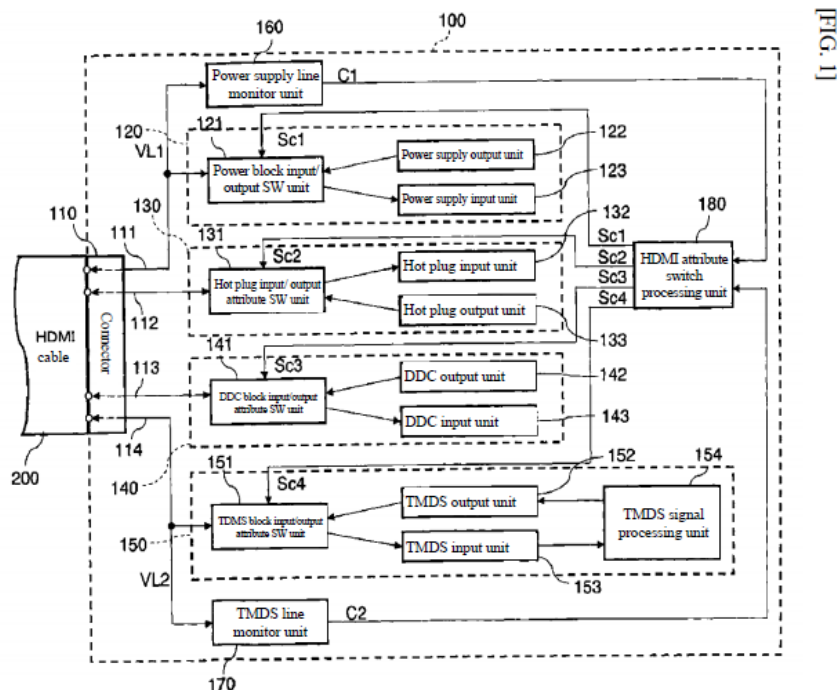


[FIG. 3]

Id. at Figs. 2-3.

67. The switching process is accomplished by HDMI attribute switching processing unit 180, which outputs control signals Sc1-Sc4 to power supply block 120, DDC block 140, hot plug block 130, and TMDS block 150 to control the

device's functions based on its operating mode. *Id.* at [0056], Fig. 1. For example, when the device is in "standby," the control signals Sc1-Sc4 control the power supply block input/output SW unit 121, the DDC block input/output attribute SW unit 141, the hot plug input/output attribute SW unit 131, and the TMDS block input/output attribute SW unit 151, so that the power supply block 120, the hot plug block 130, the DCC block 140, and the TMDS block 150 become high impedance. *Id.* at [0057]. When the device is in source mode, Sc1 switches the power supply block 120 to output, Sc2 switches the hot plug block 130 to input, Sc3 switches the DCC block 140 to output, and Sc4 switches the TMDS block 150 to output. *Id.* at [0033]. When the device is in sink mode, Sc1 switches the power supply block 120 to input, Sc2 switches the hot plug block 130 to output, Sc3 switches the DCC block 140 to input, and Sc4 switches the TMDS block 150 to input. *Id.*



[FIG. 1]

Id. at Fig. 1.

68. While Iwamoto refers to the device in sink mode as having DDC input enabled and the device in source mode as having DDC output enabled, a POSITA would have understood this to be a misnomer, because an HDMI source reads E-EDID data from an HDMI sink on the DDC channel. EX1006 at [0038]-[0039], Fig. 3. For example, the HDMI 1.3a specification explains that “[t]he DDC is used by the Source to *read* the Sink’s Enhanced Extended Display Identification Data (E-EDID) in order to discover the Sink’s configuration and/or capabilities.” EX1009 at 25, 128 (emphasis added). This is acknowledged by Iwamoto, which states that the device in sink mode outputs EDID data via the DDC block. EX1006 at [0038]-[0039], Fig. 3.

B. Overview of Hsieh (EX1008)

69. U.S. Pat. App. Pub. No. 2009/0046690 A1 to Hsieh (“Hsieh”) was filed as U.S. Application No. 11/839,543 on August 16, 2007 and published on February 19, 2009. EX1008 at 1.

70. Hsieh discloses a bi-directional high speed digital interface (“HSDI”) transceiver and “a method for supplying a bi-directional communication process on a HSDI device,” where one type of HSDI device is an HDMI device. EX1008 at [0001]-[0004]. Hsieh explains that the “HSDI transceiver with bi-directional functionality can switch its function to make itself compatible to a typical HSDI

source device/HSDI sink device, or form a bi-directional HSDI structure coupled with another HSDI transceiver with bi-directional functionality.” *Id.* at [0035]. In other words, “the first HSDI transceiver acts as a source device if the interface is coupled to [a sink], and the first HSDI transceiver acts as a sink device if the interface is coupled to [a source].” *Id.* at [0006].

71. Hsieh further teaches that “the first HSDI transceiver is pre-set to be either the source device or the sink device prior [to] receiving or generating a first control switching command,” and that the device “can be chosen to act as a source device or a sink device depending on the user’s requirement.” *Id.* at [0006], [0016]. Accordingly, “the settings of the power pin 114 and the hot plug detect pin 118, and the connection relationships of the first multiplexer 106 and the second multiplexer 112 of the HSDI transceiver 100 are pre-set...[according to] the standard for HSDI device, such as HDMI specification,” depending on the pre-set default function. *Id.* at [0016]. For example, when the HSDI transceiver is a DVD recorder (typically used as a source), “the default setting of the first multiplexer 106 is to couple to the transmitter 102, the default setting of the second multiplexer 112 is to couple to the controller 108, the controller 108 controls the third multiplexer 116 to set the power pin 114 to supply power, and controls the fourth multiplexer 120 to set the hot plug detect pin 118 to become an input node.” *Id.* at [0016].

72. Hsieh explains that the HSDI transceiver first detects whether an HSDI device is connected and then determines whether it supports bi-directional functionalities. *Id.* at [0017]-[0018], Fig. 3. Before the detection process begins, the HSDI transceiver is initially set to its default function. *Id.* at [0016]-[0017]. If the attached device has the same default function (i.e., both are sources or both are sinks), the HSDI transceiver “is unable to detect the plugged-in...HSDI device.” *Id.* at [0017]. To overcome this issue, if both devices have the same default function, the HSDI transceiver may toggle its function to “act as the source device and the sink device alternately” in order to match with and connect to the attached device. *Id.* at [0017], [0020]. After this detection process, the HSDI transceiver then determines whether the connected device has bi-directional functionality (i.e., can also swap between source and sink). *Id.* at [0018]. If the connected device is also bi-directional, the HSDI transceiver may ask the device to switch functions via switching commands. *Id.* at [0020]-[0022], Fig. 3.

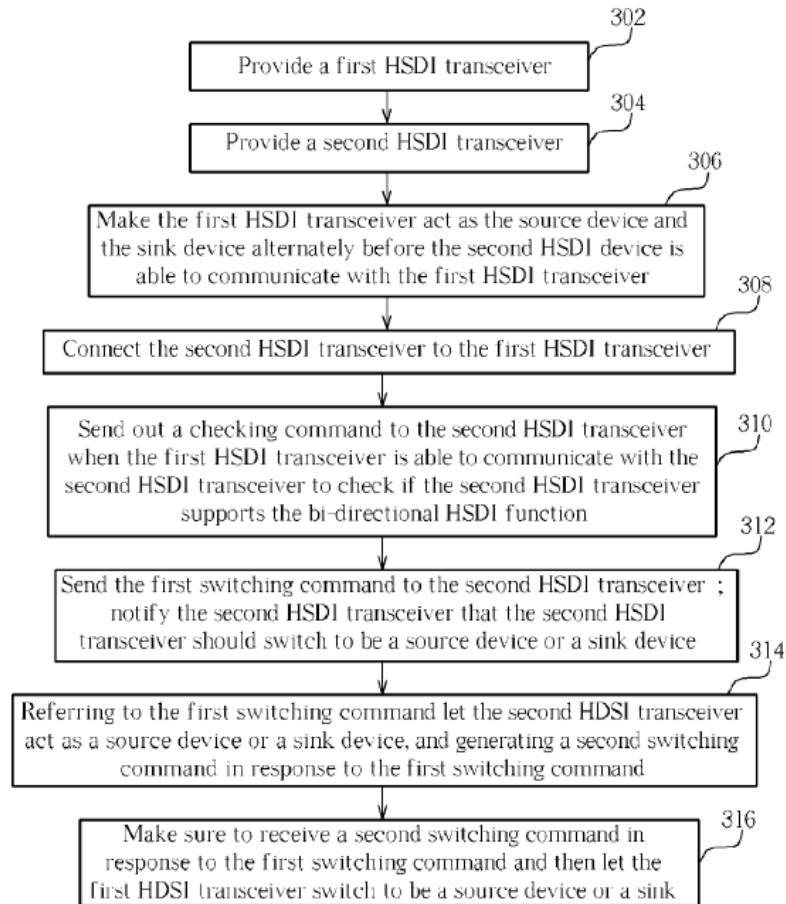


Fig. 3

Id. at Fig. 3.

C. Overview of Knight (EX1007)

73. U.S. Pat. App. Pub. No. 2008/0028237 A1 to Knight (“Knight”) was filed as U.S. Application No. 11/460,067 on July 26, 2006 and published on January 31, 2008. EX1007 at 1.

74. Knight discloses a device “capable of communicating power and data through a single connector to another device,” where the device may be configured

as a source or sink. EX1007 at [0024], [0039]-[0040]. The device may be, for example, “a dedicated network connection device..., [or] a portion of a computer, robot, [or] network appliance.” *Id.* at [0031]. Knight teaches that the device may connect to multiple other devices and enable communication between them according to PoE, Firewire, USB, or similar communication protocols. *Id.* at [0031]-[0032], [0001], [0024].

75. Fig. 1 illustrates one embodiment of the system 100 including a first device 102 connected to devices 138, 140, 142, and 144 via connector interfaces 104, 106, 108, and 110, which allow the devices to transfer power and data. *Id.* at [0022], [0024], Fig. 1. More specifically, the first device 102 includes a battery 126 that may provide power to devices 138, 140, 143, and 144. *Id.* at [0025]-[0027], [0029]. Devices 138, 140, 143, and 144 may also provide power to charge battery 126. *Id.* “In cases where the connector interfaces 104, 106, 108, or 110 are able to both sink and source power, a remote device may be able to supply power for a period of time, during which the battery bank 126 may be charged. The same remote device may then switch to a mode where the remote device can no longer source power but requires the device 102 to source power” from battery 126. *Id.* at [0030]. The power management system 124 controls the flow of power in the system and “may receive power from one or more of the remote devices, distribute power to

other remote devices, and charge or discharge the battery bank 126 as appropriate.”

Id. at [0029].

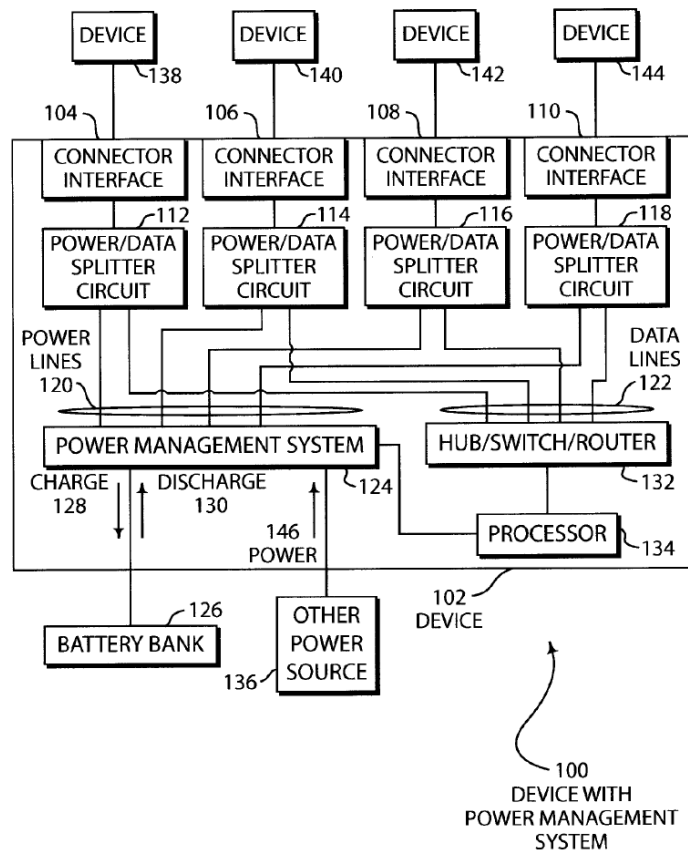


FIG. 1

Id. at Fig. 1.

76. The system may follow the method for power management 200 illustrated in Fig. 2. EX1007 at [0039], Fig. 2. According to that method, when a connection is made, the device may “first attempt[] to connect as a power source, then attempt[] to connect as a power sink if the power source attempt fails.” *Id.* at [0048]. Alternatively, the device “may be configured to attempt to connect as a

power sink initially, then attempts as a power source secondarily.” *Id.* The sink/source negotiation process “may be through sensing status and communicating through the power connections.” *Id.* at [0047]. “One example of such communication may be for a device to configure a specific resistance along the power connections to indicate that it may sink power,” in which case “the connecting device may sense the resistance and then begin supplying power to the first device.” *Id.*

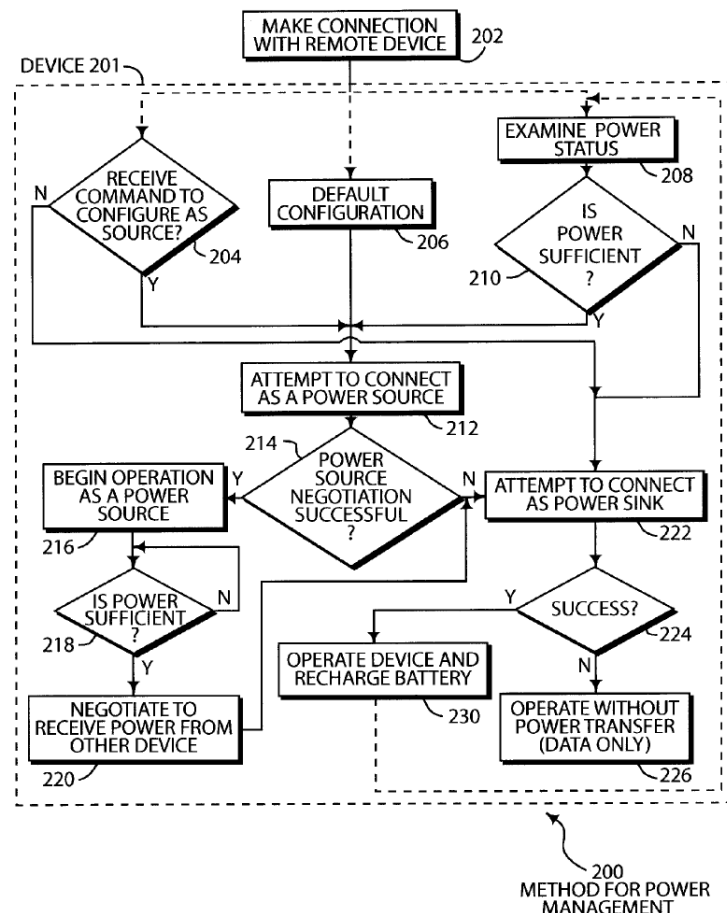


FIG. 2

Id. at Fig. 2.

D. Overview of HDMI 1.3a (EX1010)

77. The High-Definition Multimedia Interface Specification Version 1.3a (“HDMI 1.3a”) is a well-known AV interface specification authored by Hitachi, Ltd., Matsushita Electric Industrial Co., Ltd, Philips Consumer Electronics International B.V., Silicon Image, Inc., Sony Corporation, Thomson Inc., and Toshiba Corporation. EX1009 at 17. HDMI 1.3a was and remains a well-known specification published by HDMI. A POSITA would have been aware of HDMI 1.3a and would have understood how to design an HDMI-compliant AV device using HDMI 1.3a.

78. HDMI 1.3a discloses an interface for “transmitting digital television audiovisual signals from DVD players, set-top boxes and other audiovisual sources to television sets, projectors and other video displays.” EX1009 at 17. The specification describes the “[m]echanical, electrical, behavioral and protocol requirements necessary for compliance...for sources, sinks and cables.” *Id.* HDMI 1.3a explains that the “HDMI system architecture is defined to consist of Sources and Sinks,” where “[e]ach HDMI input...shall follow all of the rules for an HDMI Sink and each HDMI output shall follow all of the rules for an HDMI Source.” *Id.* at 24. The specification further teaches that “[t]he HDMI connector provides a pin allowing the Source to supply +5.0 Volts to the cable and Sink,” where “[a] Sink shall assume that any voltage within the range specified for TP2 voltage in Table 4-

22 indicates that a Source is connected and applying power to the +5V Power signal.” *Id.* at 66. Once a sink detects the +5V power line, it may assert the hot plug detect pin. *Id.* at 139. “A Source shall assume that any voltage [on the hot plug detect pin] within the range specified for High voltage level in Table 4-26 indicates that a Sink is connected.” *Id.* at 139.

79. HDMI 1.3a also teaches that HDMI-compliant sinks provide a termination pull-up resistance on the TMDS line. Specifically, the receiver of an HDMI sink includes a termination supply voltage AV_{cc} and termination resistors R_T , where AV_{cc} is 3.3 V. *Id.* at 54-56, 58, Fig. 4-12, Table 4-14.

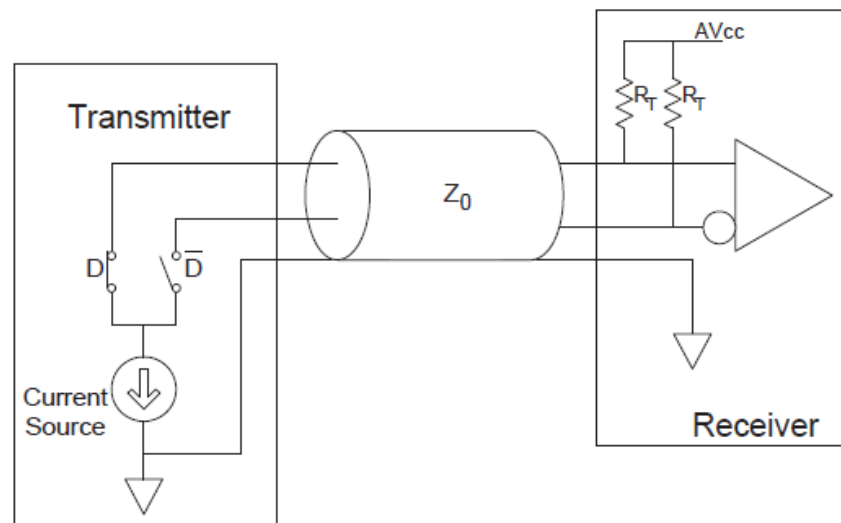


Figure 4-12 Conceptual Schematic for one TMDS differential pair

Id. at 54, Fig. 4-12.

80. The HDMI 1.3a specification further teaches that HDMI sources and sinks, “upon power-up, reset, or detection of a new [] device,” shall default to assuming that the connected device is not HDMI-capable. *Id.* at 153-53.

X. Claims 1, 4-5, 8, 11, and 14-16 are Invalid

A. Ground 1: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over Iwamoto

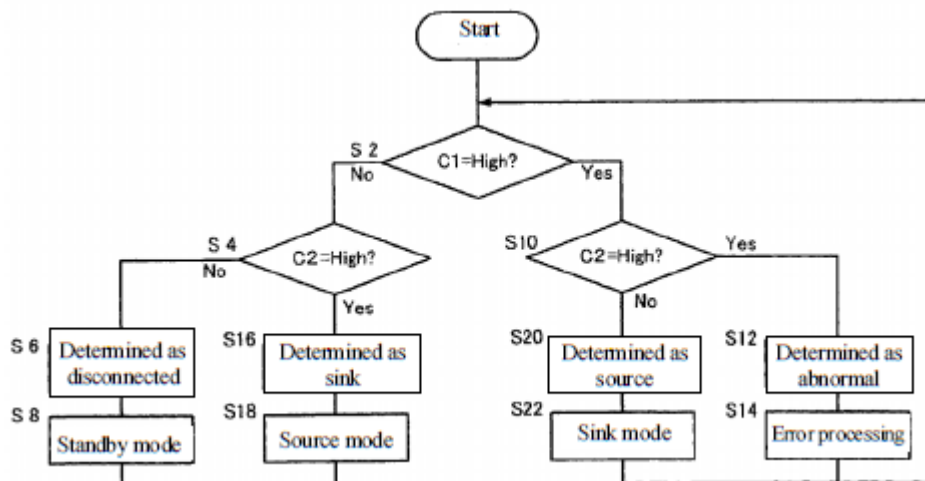
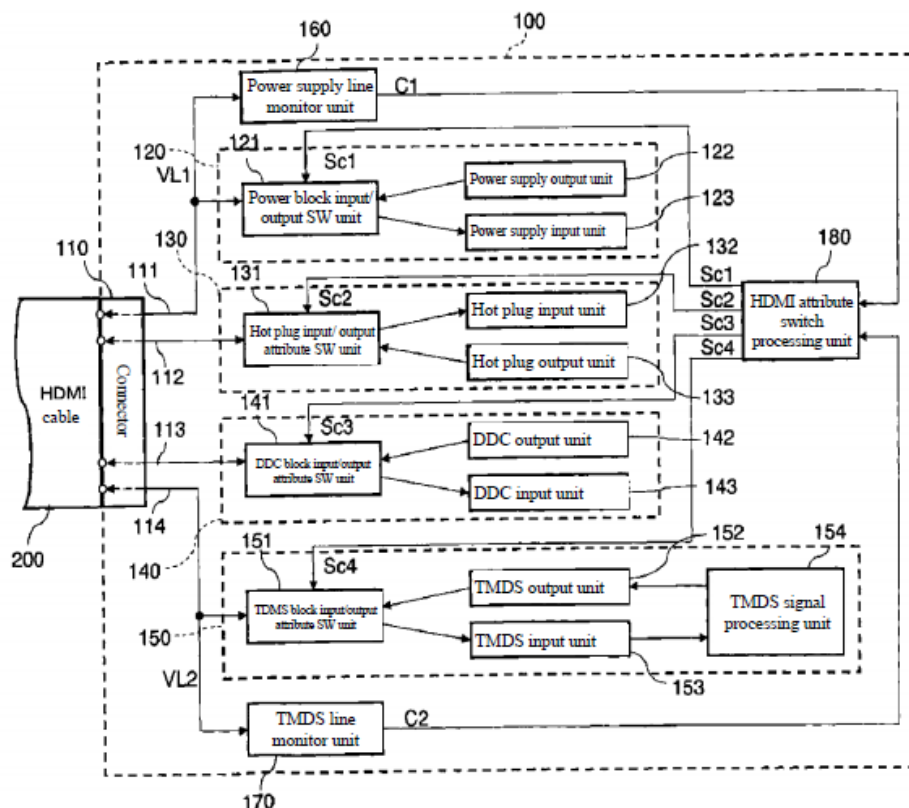
81. In my opinion, Iwamoto renders obvious claims 1, 4-5, 8, 11, and 14-16 of the '265 Patent.

1. Claim 1

a. “A method comprising:” 1[P]

82. To the extent the preamble is limiting, Iwamoto teaches the limitation. Specifically, Iwamoto teaches a “source/sink dual-purpose device conforming to the HDMI standard” that can function as a source device or a sink device. EX1006 at [0016]-[0017], Fig. 1. The dual-purpose device includes a first voltage level monitor for detecting the voltage level of the power line of an HDMI cable (VL1), and a second voltage level monitor for detecting the voltage level of a TMDS_CLK line of the HDMI cable (VL2). *Id.* at [0016]. These measurements are converted into binary signals C1 and C2, respectively. *Id.* at [0042], [0044]. Iwamoto teaches that the dual-purpose device uses these binary signals to determine whether a connected device is a source or a sink, and to “automatically switch[] its own functions”

accordingly. *Id.* at [0016], [0026]. This method for switching between source and sink is illustrated in Fig. 3.



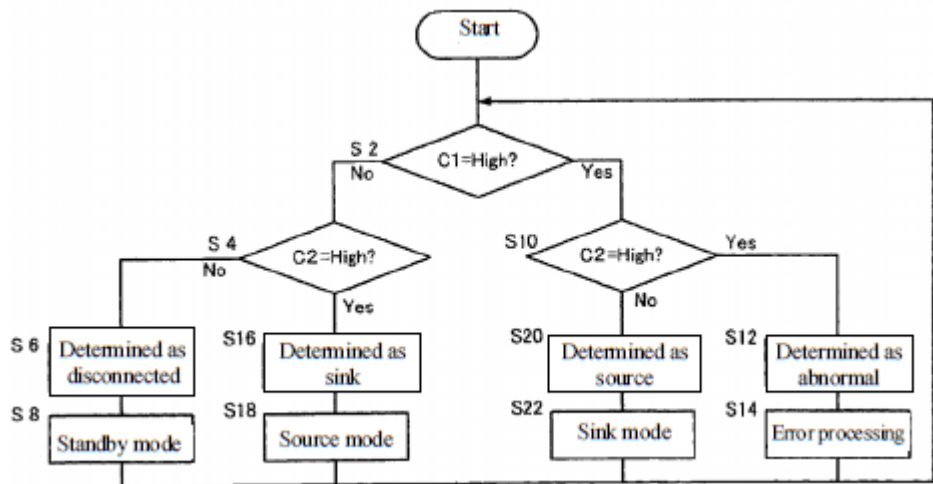
Id. at Figs. 1 and 3.

b. “initializing a first audio/video (AV) device to operate in a default AV sink operation mode in response to a power-on-reset or powering up of the first AV device;” 1[a]

83. Iwamoto teaches this limitation, or at least renders it obvious. Iwamoto discloses that the dual-purpose device has several modes depending on the two voltage levels discussed above. When VL1 and VL2 are low, C1 and C2 are low, and the dual-purpose device determines that it is not connected to a second device and therefore operates in a default standby mode. *Id.* at [0043]-[0044], [0072]-[0073], Figs. 2-3. When VL1 is high (5 V) and VL2 is low, C1 is high and C2 is low, and the dual-purpose device determines that the connected device is a source and therefore operates in sink mode. *Id.* at [0043]-[0045], [0075], [0076], Fig. 3. When VL1 is low and VL2 is high (3.3 V), C1 is low and C2 is high, and the dual-purpose device determines that the connected device is a sink and therefore operates in source mode. *Id.* Iwamoto teaches that “standby refers to a process for energizing the source/sink dual-purpose device 100 and waiting for connection.” *Id.* at [0052]. More specifically, the device begins the detection and connection process illustrated in Fig. 3 in standby mode “when power is turned on and the operation of the source/sink dual-purpose device 100 is started.” *Id.* at Fig. 3, [0062].

[FIG. 2]

C1	C2	J	M	Sc	
Power line level	TMDs CLK line level	External device function determination	Operation mode determination	Control Signal	
Low	Low	Disconnected	Standby	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
High	High	Error	Shunt	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
Low	High	Sink	Source	Sc1	Power supply output unit
				Sc2	Hot plug input unit
				Sc3	DCC output unit
				Sc4	TMDs output unit
High	Low	Source	Sink	Sc1	Power supply input unit
				Sc2	Hot plug output unit
				Sc3	DDC input unit
				Sc4	TMDs input unit



[FIG. 3]

Id. at Figs. 2, 3.

84. A POSITA would have understood that Iwamoto’s “standby” mode is “a default AV sink operation mode,” based on the teachings of the ’265 Patent. More specifically, as explained in more detail in the claim construction section (*supra* Section VIII), a POSITA would have understood that “a default AV sink operation

mode” is a default mode with certain source functionality disabled. The ’265 Patent explains that the purpose of the default mode is to prevent damage that may be caused when “two devices...attempt to drive power in opposite directions in the same power supply voltage channel of a connector,” or drive data signals, “hot plug detect signals, clock signals and/or the like” against each other on the same connector channel. EX1001 at 4:1-15, 6:25-32. This comports with the “robustness requirements” of HDMI 1.3a, which stipulate that, in order to comply with the HDMI standard, two sources cannot be damaged if they are connected together with a single cable. EX1009 at 69. A POSITA would have also recognized other benefits to disabling certain source functionalities when the device is in a default state. For example, disabling power would conserve energy while the device is running in default mode.

85. Like the claimed device, Iwamoto teaches that certain source functionalities, such as the provision of power, are disabled in standby mode. *See, e.g.,* EX1006 at [0057], Fig. 2. A POSITA would have thus understood that Iwamoto’s “standby” mode is “a default AV sink operation mode.” To the extent that Patent Owner were to argue that Iwamoto’s standby mode is not a sink mode because the device is not yet fully operational as a sink in standby mode, a POSITA would have understood from the disclosure of the ’265 Patent that full AV sink functionality does not need to be enabled in all phases of “default AV sink operation

mode.” *See supra* Section VIII. For example, the ’265 Patent teaches that certain sink functions, such as HPD and DDC output, are not enabled when the device “initialize[s] to default SINK mode,” but are enabled when the device “operate[s] as a sink device” in “SINK mode.” EX1001 at Fig. 4A. In fact, a POSITA would have understood that the functions disabled in Iwamoto’s standby mode are similar to the functions disabled when the device described in the ’265 Patent “initialize[s] to default SINK mode,” and the functions enabled in Iwamoto’s sink mode are similar to the functions enabled when the device described in the ’265 Patent “operate[s] as a sink device” in “SINK mode.” Accordingly, Iwamoto’s standby and sink modes are two phases of the claimed “AV sink operation mode.” EX1006 at [0033], [0038]-[0039], [0069], [0071], Fig. 3; EX1001 at 6:25-32, 8:65-67, 9:13-30, Fig. 4A.

86. While Iwamoto does not explicitly discuss power-on resetting the device, it would have been obvious to a POSITA in view of common general knowledge to provide Iwamoto’s device with a power-on reset function. “Power-on-reset” (“POR”) is a term of art, which a POSITA would have understood to refer to a reset function that ensures a device will start in the same condition each time that it is powered up. EX1020 at 1 (“The power-on reset (POR) circuit included in many ICs guarantees that the analog and digital blocks initialize in a known state after the power supply is applied. The basic POR function generates an internal reset pulse to avoid race conditions and keep the device static until the supply voltage reaches a

threshold that guarantees correct operation. Once the supply reaches the threshold voltage, the POR circuit releases the internal reset signal and the state machine initializes the device.”); EX1023 at 2, 6 (“Resets can be caused by...powering up the device....Power-On-Reset...insures [sic] that when the device powers up...it will be reset and start operation in a properly initialized way.”). Such functionality is well known and ubiquitous in the art, including in HDMI devices. *See, e.g.*, EX1021 at [0004], [0054], [0052], Fig. 9 (describing a multimedia sink device that defaults to a particular mode (first auxiliary mode, or “AUX mode”) after power on reset, where the device may use the HDMI protocol); EX1022 at [0007], [1011], [0006], [0025] (referring to a power-on-reset of an HDMI video receiver). Iwamoto explains that the HDMI device initializes in standby mode when the device is energized and power is turned on. EX1006 at [0052], [0062], Fig. 3. It would thus have been obvious to a POSITA in view of common general knowledge that one way to “guarantee[...]...that the...[device] is in a known [default standby] state after the power is applied” is to reset the device after it is powered on. EX1020 at 1. A POSITA also would have known that many devices in the AV field of art initialize to default settings after being powered-on or reset. For example, the HDMI 1.3a specification, with which a POSITA would have been familiar, teaches that HDMI

devices default to certain settings upon “power-up, reset, or detection of a new [] device.”² EX1009 at 152-53.

c. “detecting with control circuitry of the first AV device, a coupling between the first AV device and a second AV device;” 1[b]

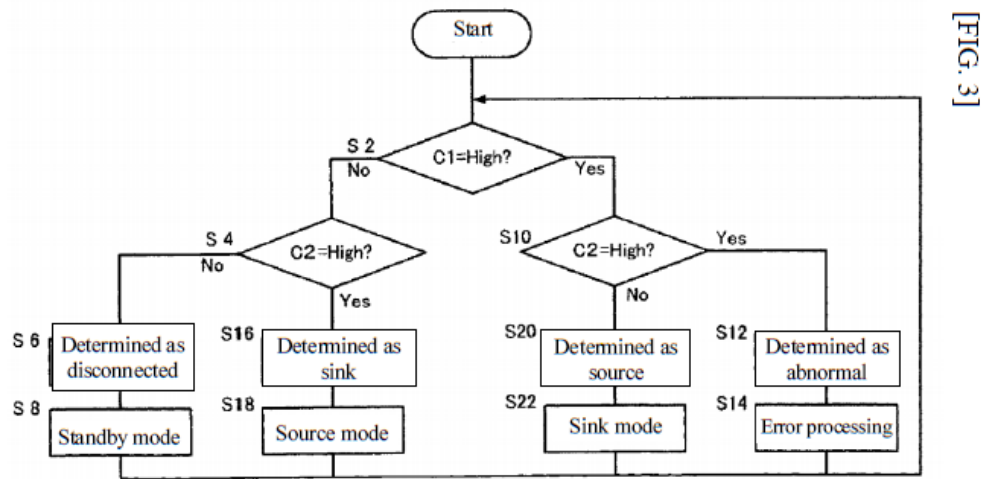
87. Iwamoto also discloses this limitation. While in the standby state, Iwamoto’s device “waits for [an] external device 20 to be connected while repeating the process of the flowchart of Fig. 3.” EX1006 at [0072]-[0073], Fig. 3; *see also id.* at [0052] (“‘Standby’ refers to a process for energizing the source/sink dual-purpose device 100 and waiting for connection of the external device.”). As described above, the device monitors the voltage level of the power line of an HDMI cable (VL1) and the voltage level of a TMDS_CLK line of the HDMI cable (VL2) to determine whether a connected device is a source or a sink, and to “automatically switch[] its own functions” accordingly. *Id.* at [0016], [0026]. Iwamoto uses the above VL1 and VL2 measurements because HDMI compliant source devices supply 5V of power on a power pin of the HDMI connector (EX1009 at 66), and HDMI compliant sink devices provide a termination voltage AV_{cc} of 3.3 V on the TMDS line of the HDMI connector (*Id.* at 54-56, 58, Fig. 4-12, Table 4-14.). Thus, when VL1 and VL2 are both low (i.e., C1 and C2 are low), this indicates that an external device is not

² To the extent Patent Owner argues that this limitation is not obvious over Iwamoto alone, it is also obvious over Iwamoto in view of HDMI 1.3a. *Supra* Section X.E.2.a.

connected. EX1006 at [0065]. When either VL1 is high (5V) or VL2 is high (3.3V)—but not both—the device determines that a source or sink is connected, respectively. *Id.* at Fig. 2. The detection process is carried out by power supply monitor unit 160, TMDS monitor unit 170, and HDMI attribute switch processing unit 180, which include control circuitry and detector logic for determining the state of the connected device. *Id.* at Fig. 1, [0062].

[FIG. 2]

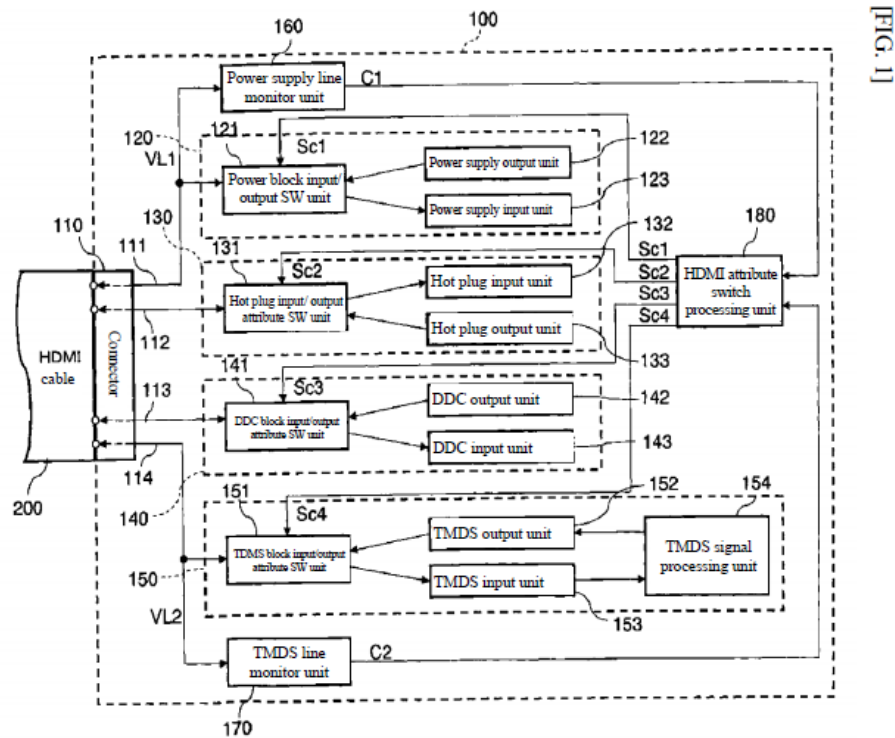
C1	C2	J	M	Sc	
Power line level	TMDS CLK line level	External device function determination	Operation mode determination	Control Signal	
Low	Low	Disconnected	Standby	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
High	High	Error	Shunt	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
Low	High	Sink	Source	Sc1	Power supply output unit
				Sc2	Hot plug input unit
				Sc3	DCC output unit
				Sc4	TMDS output unit
High	Low	Source	Sink	Sc1	Power supply input unit
				Sc2	Hot plug output unit
				Sc3	DDC input unit
				Sc4	TMDS input unit



Id. at Figs. 2-3.

d. “determining whether a first supply voltage is provided at a channel of a connector, the connector coupling the first AV device and the second AV device;” 1[c]

88. This limitation is also taught by Iwamoto. Iwamoto discloses that the device includes a power supply monitor unit 160 for measuring a first supply voltage VL1 provided at a power source channel 111 of connector 110, which “conforms to the HDMI standard” and is connected to another source device or sink device conforming to the HDMI standard via HDMI cable 200. *Id.* at [0028]-[0029], [0031], [0042], Fig. 1. The device uses the voltage measurement to generate a binary signal C1 and determine whether the connected device is a source or a sink. *Id.* at [0016], [0026]. More specifically, when VL1 on channel 111 is high (5 V), C1 is high; when VL2 is low, C1 is low. *Id.* at [0042]-[0043].



Id. at Fig. 1.

e. “in response to determining that the first supply voltage is provided at the channel of the connector, configuring communication logic of the first AV device to continue operating the first AV device in the AV sink operation mode;” 1[d]

89. Iwamoto also teaches this limitation. In response to determining that the first supply voltage VL1 is provided at the connector (i.e., C1 is high) and the second voltage VL2 at the TMDS CLK line is low (i.e., C2 is low), the device determines that it is connected to a source and should operate in sink mode.³ *Id.* at

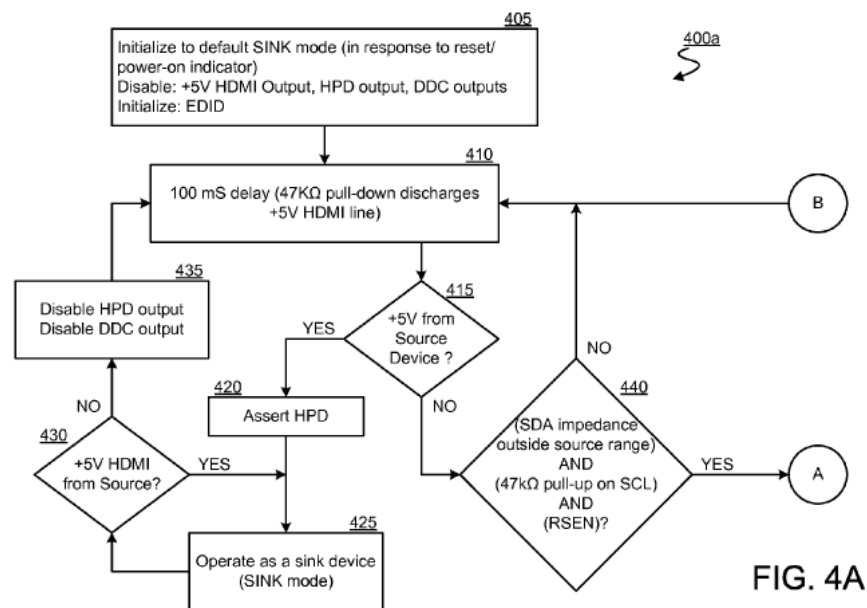
³ The claim does not require that the first supply voltage *alone* triggers the device to continue operating in sink mode. While Iwamoto discloses that the device continues operating in sink mode in response to two things—the claimed supply

Fig. 2, [0063]-[0064], [0070]. The HDMI attribute switch processing unit 180 sends control signals sc1-sc4 to communication logic comprising power supply block 120, DDC block 140, hot plug block 130, and TMDS block 150 instructing the device to operate in sink mode. *Id.* at [0056], [0033]. Specifically, when the device is in sink mode, Sc1 switches the power supply block 120 to input, Sc2 switches the hot plug block 130 to output, Sc3 switches the DCC block 140 to input, and Sc4 switches the TMDS block 150 to input. *Id.* at [0033].

90. A POSITA would have understood that switching from Iwamoto’s “standby” mode to “sink” mode constitutes “continu[ing] [to] operat[e] the first AV device in the AV sink operation mode.” As explained with reference to limitation 1[a], a POSITA would have understood that Iwamoto’s standby mode is a phase of “a default AV sink operation mode” with certain source functionality disabled, and not necessarily a fully operational phase of sink mode. *Supra* Sections VIII and X.A.1.b. Although the claim recites that the device “continues operating...in the AV sink operation mode” in response to determining that “the first supply voltage is provided,” the ’265 Patent explains that the device is initialized in “default SINK mode” at step 405 in response to being reset or powered on, but doesn’t “operate as a sink device” in “SINK mode” until step 425, after voltage on the power line is

voltage determination and the TMDS_CLK line determination—this disclosure still meets the claim limitation.

detected. EX1001 at Fig. 4A, 8:65-67, 9:13-30. In the first phase of sink mode—“initialize to default SINK mode”—certain source and sink functionalities are disabled, including +5V HDMI output, HPD output, and DDC outputs. *Id.* In the second phase of sink mode—“[o]perate as a sink device (SINK mode)” —certain sink functionalities are enabled, including HPD output and DDC output. *Id.* The ’265 Patent thus contemplates that switching from a first phase with certain source and sink functions disabled to a second phase with AV sink functions enabled means that the device “continue[s] operating the first AV device in the AV sink operation mode.”



Id. at Fig. 4A.

91. As explained above, Iwamoto’s device similarly initializes in a default mode in which certain source functionalities are disabled, and only operates in sink

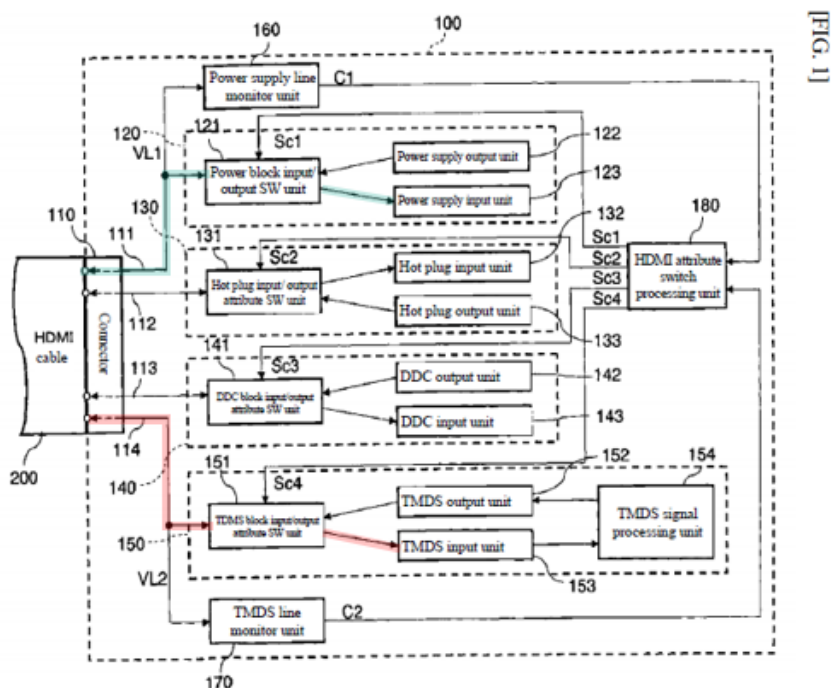
mode after determining that the first supply voltage VL1 is provided at the connector (i.e., C1 is high) and the second voltage VL2 at the TMDS CLK line is low (i.e., C2 is low). EX1006 at Fig. 2, [0063]-[0064], [0070].

f. “when operating the first AV device in the AV sink operation mode, receiving AV data provided to the first AV device via the connector and receiving power from the first supply voltage provided to the first AV device at the channel of the connector;” 1[e]

92. Iwamoto also discloses this limitation. Iwamoto teaches that HDMI attribute switching processing unit 180 outputs control signals Sc1-Sc4 to power supply block 120, DDC block 140, hot plug block 130, and TMDS block 150 to control the device’s functions based on its operating mode. *Id.* at [0056], Fig. 1. When the device is in sink mode, Sc1 switches the power supply block 120 to input, Sc2 switches the hot plug block 130 to output, Sc3 switches the DCC block 140 to input⁴, and Sc4 switches the TMDS block 150 to input. *Id.* at [0033]. Iwamoto explains that the device can receive “video data and the TDMS [sic] system audio data transmitted from the source device” to TMDS input unit 153 (highlighted below in red), as well as power from the source device via HDMI compliant connector 110

⁴ While Iwamoto refers to the device in sink mode as having DDC input enabled and the device in source mode as having DDC output enabled, this appears to be a misnomer. EX1006 at [0038]-[0039], Fig. 3; *supra* ¶ 68.

to power supply input unit 123 (highlighted below in green) when operating in AV sink mode. *Id.* at [0041], [0033], Fig. 1⁵.



Id. at Fig. 1.

g. “in response to determining that the first supply voltage is not provided at the channel of the connector, configuring the communication logic of the first AV device to transition the first AV device from the AV sink operation mode to an AV source operation mode; and” 1[f]

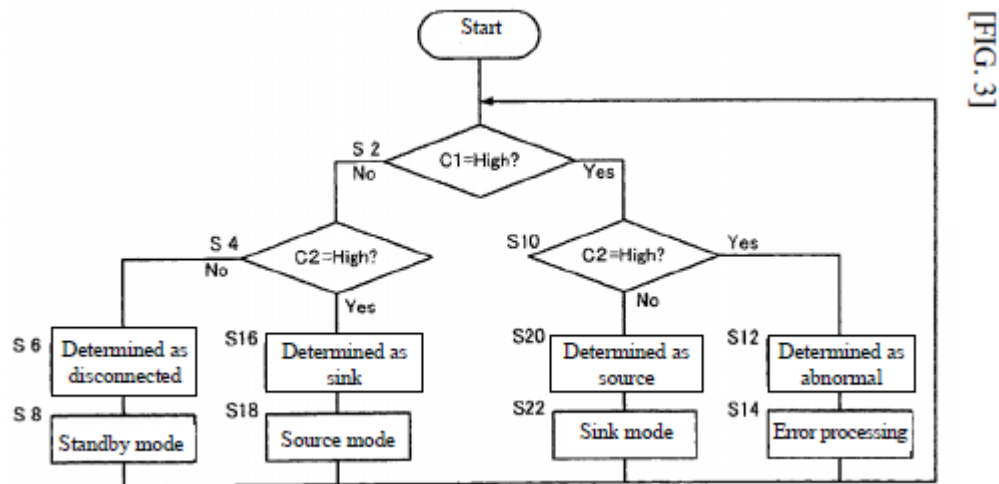
93. Iwamoto also discloses this limitation. Iwamoto teaches that, when the device detects that the first supply voltage VL1 is not provided on line 111 of connector 110 (C1 is low), and the voltage at the TMDS CLK line is high (C2 is high), the HDMI attribute switching processing unit 180 determines that the device

⁵ All color annotations in figures have been added unless otherwise stated.

is connected to a sink and configures the device to operate in source mode. *Id.* at Figs. 2, 3, [0046], [0049], [0054]. According to the method of Fig. 3, the device may cycle from sink to standby to source when the device (a) is initially connected to a source, (b) the source is disconnected, and (c) a sink is connected. *Id.* at Fig. 3, [0062]-[0070]. To the extent that Patent Owner argues that this limitation requires a direct transition from sink to source mode, this is disclosed by Iwamoto because, as explained above with reference to limitations 1[a] and 1[d], Iwamoto's standby mode is equivalent to what the '265 Patent defines as an initial stage of sink mode. *Supra* Sections VIII, X.A.1.b, and X.A.1.e.

[FIG. 2]

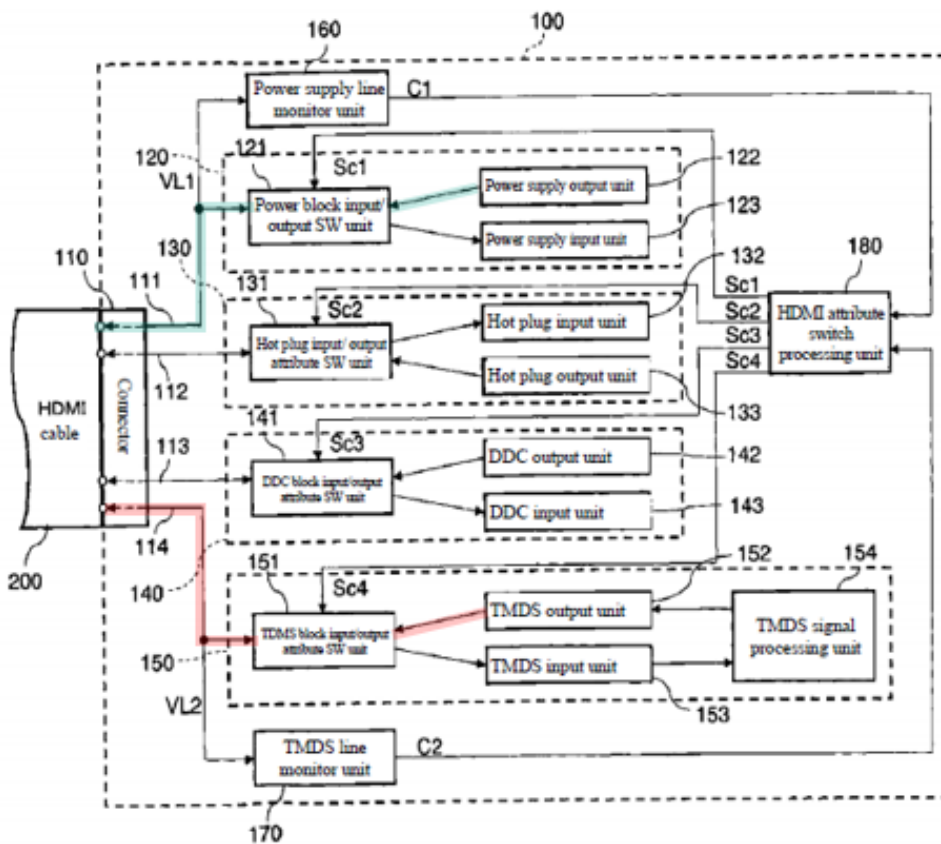
C1	C2	J	M	Sc	
Power line level	TMD5 CLK line level	External device function determination	Operation mode determination	Control Signal	
Low	Low	Disconnected	Standby	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
High	High	Error	Shunt	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
Low	High	Sink	Source	Sc1	Power supply output unit
				Sc2	Hot plug input unit
				Sc3	DCC output unit
				Sc4	TMD5 output unit
High	Low	Source	Sink	Sc1	Power supply input unit
				Sc2	Hot plug output unit
				Sc3	DDC input unit
				Sc4	TMD5 input unit



EX1006 at Figs. 2-3.

h. “when operating the first AV device in the AV source operation mode, sending AV data via the connector and providing a second supply voltage at the channel of the connector.” 1[g]

94. Iwamoto also discloses this limitation. Iwamoto discloses that when the device is in source mode, Sc1 switches the power supply block 120 to output, Sc2 switches the hot plug block 130 to input, Sc3 switches the DCC block 140 to output, and Sc4 switches the TMDS block 150 to output. *Id.* at [0033]. Iwamoto further explains that, when the device is in source mode, the power supply output unit 122 and TMDS output unit 152 are activated so that the device may send AV data via channel 114 of the connector 110 (highlighted in red below) and may provide power at channel 111 of connector 110 (highlighted in green below). *Id.* at Fig. 1, [0031], [0033], [0038], [0040].



[FIG. 1]

Id. at Fig. 1.

2. Claim 4: “The method of claim 1, further comprising: performing an AV data exchange between the first device and the second device.”

95. For the same reasons explained above with respect to limitations 1[e] and 1[g], Iwamoto teaches sending AV data from the first device to the second device in the source mode and receiving data from the second device at the first device in sink mode. *Supra* Sections X.A.1.f and X.A.1.h ; *see* EX1006 at [0056], [0031], [0033], [0038], [0040], [0041], Fig. 1.

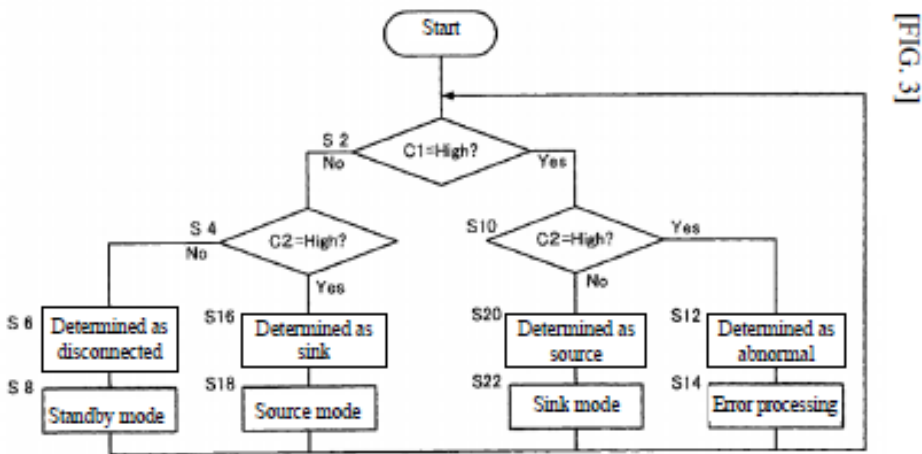
3. Claim 5

a. **“The method of claim 4, further comprising: detecting a change to the connectivity of the first AV device after the AV data exchange; and” 5[a]**

96. Iwamoto also teaches claim 5. Iwamoto discloses a method illustrated in Fig. 3, where the first device may operate as a sink or source to exchange AV data with a second connected device, and then transition to standby mode upon detecting that the second device has been disconnected (i.e., C1 and C2 are low). *Id.* at [0065], Figs. 2-3. More specifically, when the device is in source or sink mode, it periodically “monitors the state of the external device 20 while repeating the process of the flowchart of Fig. 3.” *Id.* at [0075]-[0076]. “Then, when the state of the external device 20 changes, the operating mode of the device itself is reset in accordance with the change.” *Id.* Once “the connection with the external device 20...is cut off,” the device re-enters state 1 (non-connection), in which the device is set to standby and waits for the external device to be connected. *Id.* at [0077], [0073].

[FIG. 2]

C1	C2	J	M	Sc	
Power line level	TMD5 CLK line level	External device function determination	Operation mode determination	Control Signal	
Low	Low	Disconnected	Standby	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
High	High	Error	Shunt	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
Low	High	Sink	Source	Sc1	Power supply output unit
				Sc2	Hot plug input unit
				Sc3	DCC output unit
				Sc4	TMD5 output unit
High	Low	Source	Sink	Sc1	Power supply input unit
				Sc2	Hot plug output unit
				Sc3	DDC input unit
				Sc4	TMD5 input unit



Id. at Figs. 2-3.

b. “in response to the detected change to the connectivity, placing the communication logic into the AV sink operation mode.” 5[b]

97. For the same reasons explained above with respect to limitation 5[a], Iwamoto teaches that the device re-enters standby mode when the second device is

disconnected. *Id.* at [0065], [0075]-[0077], [0073], Figs. 2-3; *supra* Section X.A.3.a. As further explained above with respect to limitations 1[a] and 1[d], Iwamoto's standby mode is equivalent to what the '265 Patent defines as the first phase of sink mode. *Supra* Sections VIII, X.A.1.b, and X.A.1.e; EX1006 at [0033], [0043]-[0045], [0052], [0056], [0062]-[0064], [0070], [0072]-[0076], Figs. 2-3; EX1001 at Fig. 4A, 8:65-67, 9:13-30.

4. Claim 8

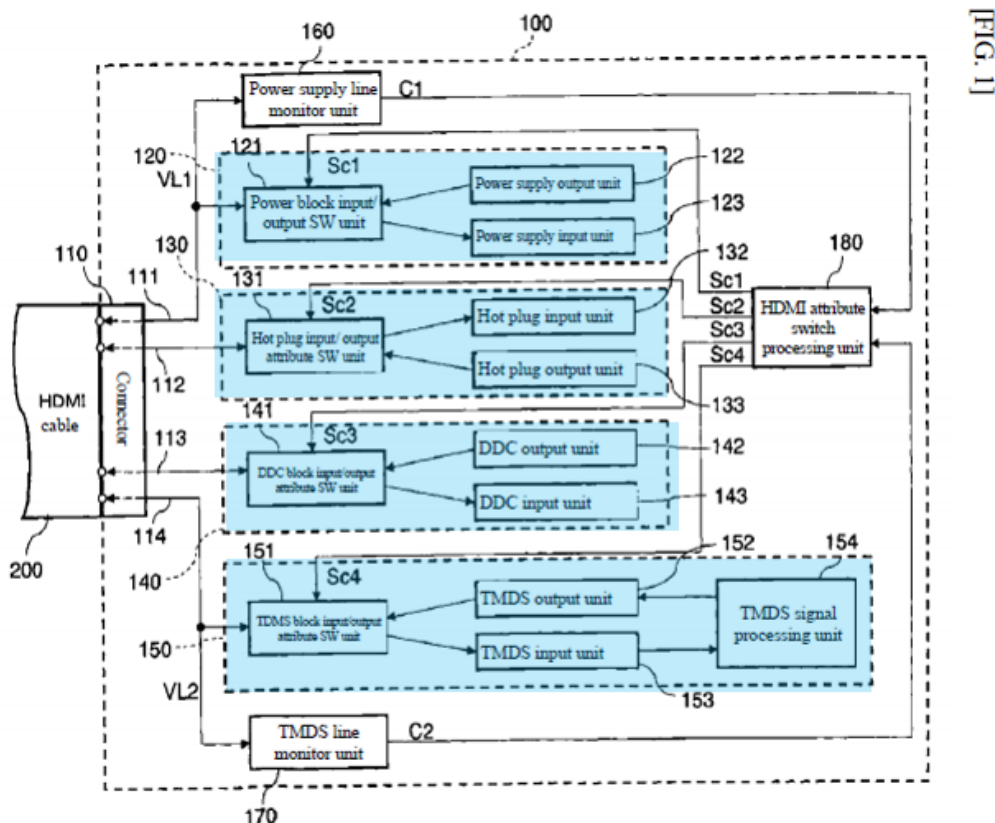
a. “An audio/video (AV) device comprising:” 8[p]

98. To the extent that the preamble is limiting, Iwamoto teaches this limitation. For the same reasons explained above with respect to limitation 1[p] (as well as the claim elements of claim 1), Iwamoto also teaches limitation 8[p]. *Supra* Section X.A.1.a; EX1006 at [0016]-[0017], [0026], [0042], [0044], Figs. 1, 3. Specifically, Iwamoto teaches a “source/sink dual-purpose device conforming to the HDMI standard” that can function as a source device or a sink device. EX1006 at [0016]-[0017], Fig. 5.

b. “communication logic to couple to a connector, the communication logic including circuitry configured to implement:” 8[a]

99. For the same reasons explained above with respect to limitations 1[c] and 1[d], Iwamoto teaches limitation 8[a]. *Supra* Sections X.A.1.d and X.A.1.e; *see* EX1006 at [0016], [0026], [0028]-[0029], [0031], [0033], [0042]-[0043], [0056], [0063]-[0064], [0070], Fig. 1. More particularly, Iwamoto teaches that the AV

device includes a connector 110 coupled to communication logic with circuitry (highlighted in blue below) comprising power supply block 120, hot plug block 130, DDC block 140, and TMDS block 150. EX1006 at [0028], Fig.1.

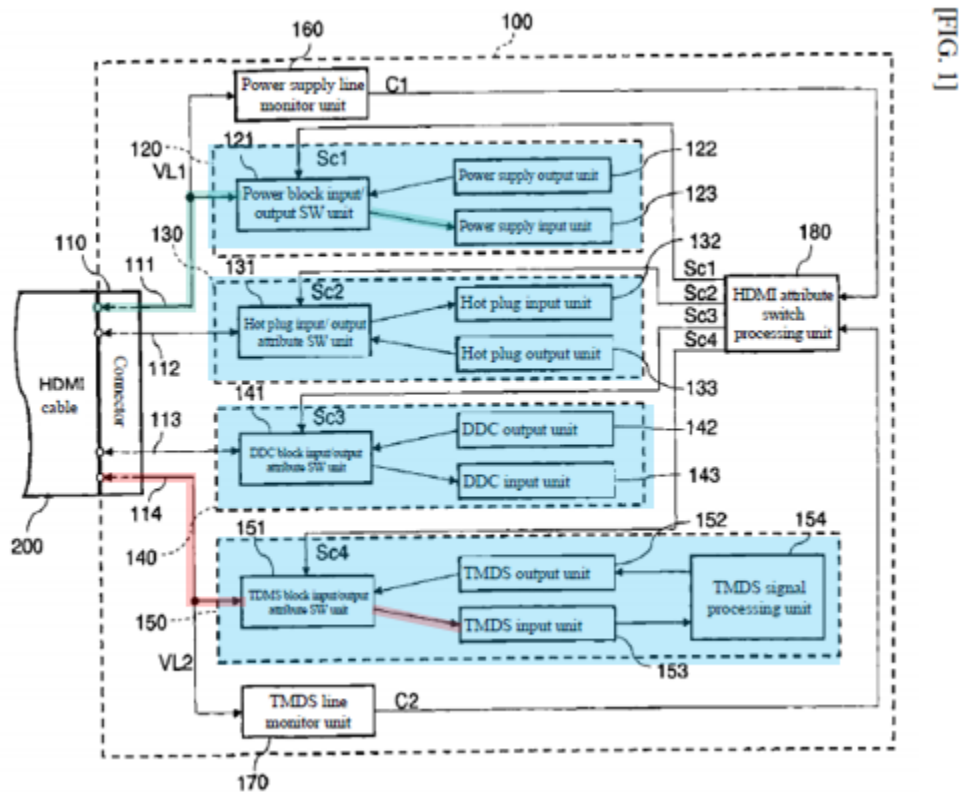


Id. at Fig. 1.

c. “an AV sink operation mode for the communication logic to receive AV data provided to the AV device at the connector and to receive power from a first supply voltage provided to the AV device via a channel of the connector,” 8[a.1.i]

100. For the same reasons explained above with respect to limitation 1[e], Iwamoto teaches limitation 8[a.1.i]. *Supra* Section X.A.1.f; *see* [0056], [0033], [0041], Fig. 1. More particularly, Iwamoto discloses that the device can receive

“video data and the TDMS [sic] system audio data transmitted from the source device” to TMDS input unit 153 of the communication logic (data path highlighted below in red), as well as power from the source device via channel 111 of HDMI compliant connector 110 to power supply input unit 123 (power path highlighted below in green) when operating in AV sink mode. EX1006 at [0041], [0033], Fig. 1.



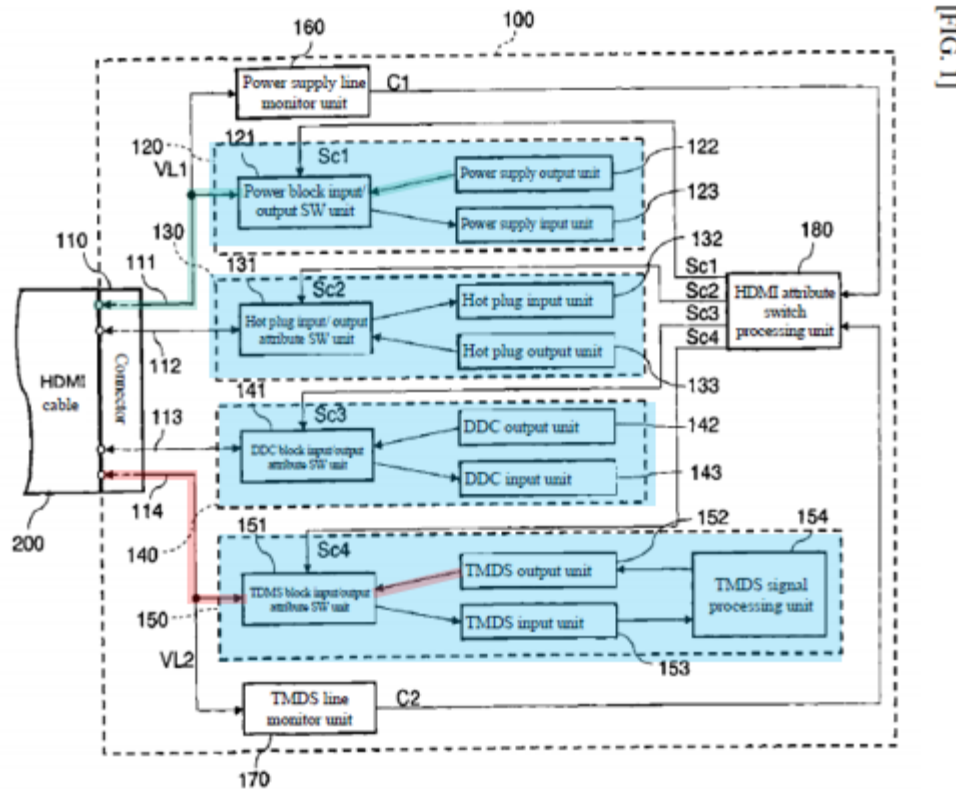
Id. at Fig. 1.

d. “the AV sink operation mode being a default mode of operation for the AV device, and” 8[a.1.ii]

101. For the same reasons explained above with respect to limitation 1[a], Iwamoto teaches limitation 8[a.1.ii]. *Supra* Section X.A.1.b; *see* EX1006 at [0043]-[0045], [0052], [0062], [0072]-[0076], Figs. 2-3.

e. “an AV source operation mode for the communication logic to send AV data from the AV device via the connector and to provide a second supply voltage at the channel of the connector; and” 8[a.2]

102. For the same reasons explained above with respect to limitation 1[g], Iwamoto teaches limitation 8[a.2]. *Supra* Section X.A.1.h; *see* EX1006 at [0031], [0033], [0038], [0040], Fig. 1. More particularly, Iwamoto explains that, when the device is in source mode, the power supply output unit 122 and TMDS output unit 152 of the communication logic are activated so that the device may send AV data via channel 114 of the connector 110 (data path highlighted in red below) and may provide power at channel 111 of connector 110 (power path highlighted in green below). EX1006 at Fig. 1, [0031], [0033], [0038], [0040].

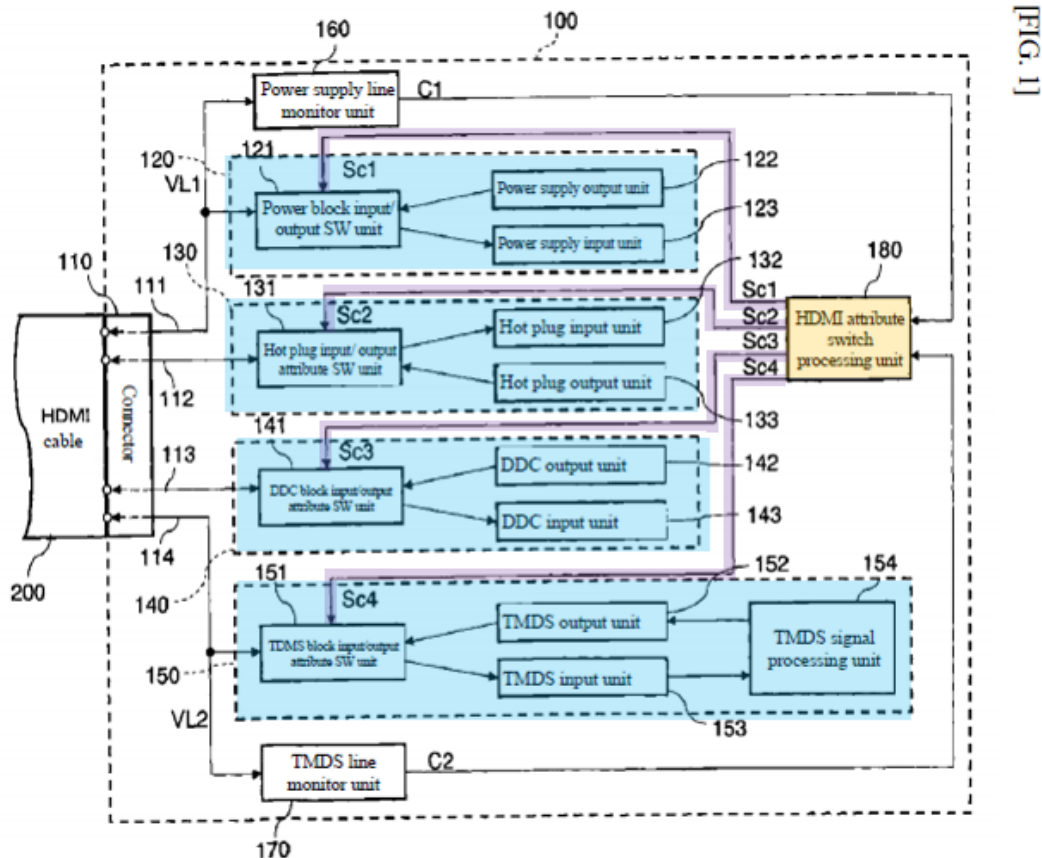


Id. at Fig. 1.

f. “control logic including circuitry to configure the communication logic to initialize the AV device to operate in the default AV sink operation mode in response to a power-on-reset or powering up of the AV device,” 8[b.1]

103. For the same reasons explained above with respect to limitation 1[a], Iwamoto teaches limitation 8[b.1]. *Supra* Section X.A.1.b; *see* EX1006 at [0043]-[0045], [0052], [0062], [0072]-[0076], Figs. 2-3. More particularly, Iwamoto teaches that the device includes control logic with circuitry comprising HDMI attribute switch processing unit 180 (highlighted below in orange), which outputs control signals Sc1-Sc4 (highlighted below in purple) to power supply block 120, DDC block 140, hot plug block 130, and TMDs block 150 of the communication

logic (highlighted below in blue) to control the device's functions based on its operating mode. EX1006 at [0056], Fig. 1. For example, when the device is in "standby," the control signals Sc1-Sc4 control the power supply block input/output SW unit 121, the DDC block input/output attribute SW unit 141, the hot plug input/output attribute SW unit 131, and the TMDS block input/output attribute SW unit 151, so that the power supply block 120, the hot plug block 130, the DCC block 140, and the TMDS block 150 become high impedance. *Id.* at [0057]. As further explained above with respect to limitations 1[a] and 1[d], Iwamoto's standby mode is equivalent to what the '265 Patent defines as the first phase of sink mode. *Supra* Sections VIII, X.A.1.b, and X.A.1.e; EX1006 at [0033], [0043]-[0045], [0052], [0056], [0062]-[0064], [0070], [0072]-[0076], Figs. 2-3; EX1001 at Fig. 4A, 8:65-67, 9:13-30.



Id. at Fig. 1.

g. “to continue operating the AV device in the AV sink operation mode in response to determining that the first supply voltage is provided at the channel of the connector, and to configure the communication logic to transition the AV device from the AV sink operation mode to the AV source operation mode in response to determining that the first supply voltage is not provided at the channel of the connector.” 8[b.2]

104. For the same reasons explained above with respect to limitations 1[c], 1[d], and 1[f], Iwamoto teaches limitation 8[b.2]. *Supra* Sections X.A.1.d, X.A.1.e, and X.A.1.g; *see* EX1006 at [0016], [0026], [0028]-[0029], [0031], [0033], [0042]-

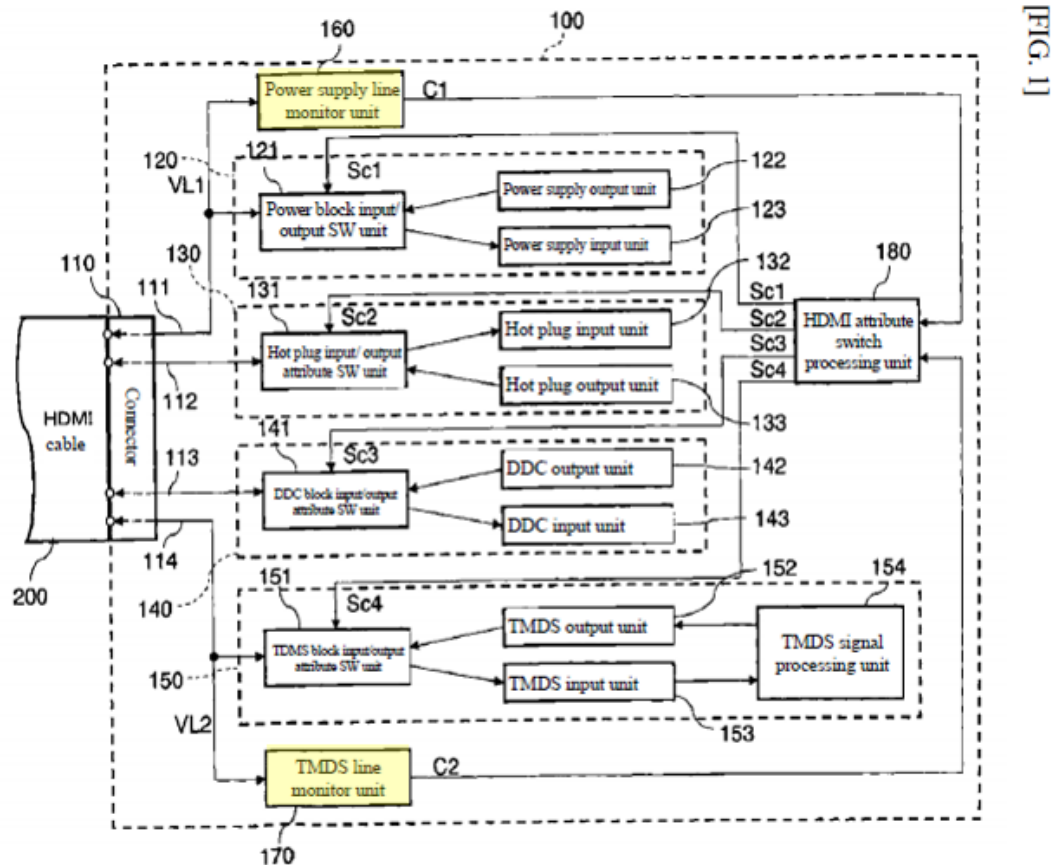
[0043], [0046], [0049], [0054], [0056], [0062]-[0070], Figs. 1-3; EX1001 at Fig. 4A, 8:65-67, 9:13-30.

5. Claim 11

a. “The device of claim 8, further comprising: detector logic to detect, while the communication logic is in the default operation mode, a coupling of the AV device to another AV device via the connector; and” 11[a]

105. For the same reasons explained above with respect to limitation 1[b], Iwamoto teaches limitation 11[a]. *Supra* Section X.A.1.c; *see* EX1006 at [0016], [0026], [0052], [0062], [0065], [0072]-[0073], Figs. 1-3. More particularly, Iwamoto teaches that the device includes detector logic comprising power supply monitor unit 160 and TMDS line monitor unit 170 (highlighted below in yellow), which detect a coupling of the AV device to another AV device. EX1006 at Fig. 1. While in the standby state, Iwamoto’s device “waits for [an] external device 20 to be connected while repeating the process of the flowchart of Fig. 3.” *Id.* at [0072]-[0073], Fig. 3; *see also id.* at [0052] (“‘Standby’ refers to a process for energizing the source/sink dual-purpose device 100 and waiting for connection of the external device.”). Power supply monitor unit 160 monitors the voltage level of the power line of an HDMI cable (VL1) and TMDS line monitor unit 170 monitors the voltage level of a TMDS_CLK line of the HDMI cable (VL2) to determine whether a connected device is a source or a sink, so that the device may “automatically switch[] its own functions” accordingly. *Id.* at [0016], [0026]. When VL1 and VL2 are both low, this

indicates that an external device is not connected. *Id.* at [0065]. When either VL1 or VL2 are high (but not both), the device determines that a source or sink is connected. *Id.* at Fig. 2.



Id. at Fig. 1.

b. “wherein the communication logic is further configured to perform an AV data exchange with the other device in response to the detection.” 11[b]

106. For the same reasons explained above with respect to limitations 1[g] and 1[e], Iwamoto teaches limitation 11[b]. *Supra* Sections X.A.1.h and X.A.1.f; *see* EX1006 at [0056], [0031], [0033], [0038], [0040], [0041], Fig. 1

6. Claim 14

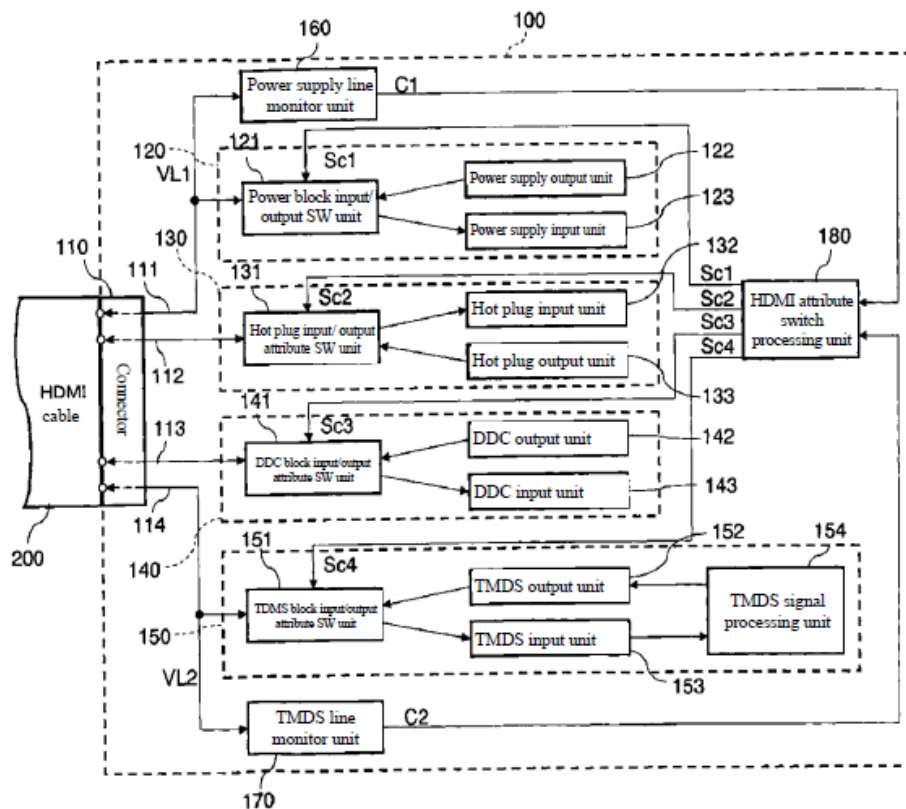
107. Claim 14 is similar to claim 8, with the only differences being the preamble (14[p]) and the addition of a connector (14[a]). As discussed below, Iwamoto discloses limitations 14[p] and 14[a]. The remaining limitations of claim 14 are disclosed by Iwamoto for the reasons explained above with respect to claim 8. *Supra* Section X.A.4.

a. “A system comprising:” 14[p]

108. To the extent that the preamble is limiting, Iwamoto teaches this limitation. For the same reasons explained above with respect to limitations 1[p] and 8[p], Iwamoto teaches limitation 14[p]. *Supra* Sections X.A.1.a and X.A.4.a; *see* EX1006 at [0016]-[0017], [0026], [0042], [0044], Figs. 1, 3, 5.

b. “a connector;” 14[a]

109. For the same reasons explained above with respect to limitation 1[c], Iwamoto teaches limitation 14[a]. *Supra* Section X.A.1.d; *see* EX1006 at [0016], [0026], [0028]-[0029], [0031], [0042]-[0043], Fig.1. Specifically, Iwamoto teaches that the device includes a connector 110. EX1006 at [0028], Fig. 1.



[FIG. 1]

Id. at Fig. 1.

7. Claim 15: “The system of claim 14, further comprising: detector logic to detect, while the communication logic is in the default operation mode, a coupling of the system to an AV device via the connector; and wherein the communication logic is further configured to perform an AV data exchange with the AV device in response to the detection.”

110. For the same reasons explained above with respect to Claim 11, Iwamoto teaches Claim 15. *Supra* Section X.A.5; see EX1006 at [0016], [0026], [0052], [0062], [0065], [0072]-[0073], Figs. 1-3.

8. Claim 16: “The system of claim 15, wherein the detector logic is further configured to detect a change to the connectivity after the AV data exchange, wherein, in response to the detected change to

the connectivity, the control logic further configured to place the communication logic into the AV sink operation mode.”

111. For the same reasons explained above with respect to Claim 5, Iwamoto teaches claim 16. *Supra* Section X.A.3; see EX1006 at [0033], [0043]-[0045], [0052], [0056], [0062]-[0064], [0065], [0070], [0072]-[0077], Figs. 2-3; EX1001 at Fig. 4A, 8:65-67, 9:13-30. As explained with respect to Claim 11, the device includes detector logic comprising power supply monitor unit 160 and TMDS line monitor unit 170, which detect a coupling of the AV device to another AV device. *Supra* Section X.A.5.a; EX1006 at Fig. 1. As explained with respect to limitation 8[b.1], the device also includes control logic comprising HDMI attribute switch processing unit 180, which outputs control signals Sc1-Sc4 to power supply block 120, DDC block 140, hot plug block 130, and TMDS block 150 of the communication logic to control the device’s functions based on its operating mode. EX1006 at [0056], Fig. 1; *supra* Section X.A.4.f.

B. Ground 2: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over Iwamoto in Combination with Hsieh

112. In my opinion, Iwamoto in combination with Hsieh renders obvious claims 1, 4-5, 8, 11, and 14-16 of the ’265 Patent.

1. Motivation to Combine Iwamoto and Hsieh.

113. To the extent that Patent Owner incorrectly argues that claims 1, 4-5, 8, 11, and 14-16 of the ’265 Patent are not taught by Iwamoto alone, these claims are

also obvious over Iwamoto in view of Hsieh. As explained in Section IX.B, Hsieh teaches a bi-directional high speed digital interface (“HSDI”) transceiver and “a method for supplying a bi-directional communication process on a HSDI device.” EX1008 at [0001]-[0004]. Like the device of Iwamoto, the device taught by Hsieh may be HDMI-compliant and is designed to “act as a source device if the interface is coupled to [a sink], and...act[] as a sink device if the interface is coupled to [a source].” *Id.* at [0006], [0016]. However, unlike Iwamoto, Hsieh contemplates that a first bi-directional source/sink device may be connected to a second bi-directional source/sink device, rather than a traditional source or sink only device. More specifically, Hsieh explains that the “HSDI transceiver with bi-directional functionality can switch its function to make itself compatible to a typical HSDI source device/HSDI sink device, *or form a bi-directional HSDI structure coupled with another HSDI transceiver with bi-directional functionality.*” *Id.* at [0035] (emphasis added).

114. Iwamoto’s disclosure is silent as to what would occur if a first dual-role device in standby is connected to a second dual-role device in standby. If Iwamoto’s dual-role device in standby outputs low VL1 and VL2 values (because it does not provide 5 V on the power line of the HDMI connector or 3.3 V on the TMDS line of the connector), then two connected dual-role devices would likely remain in standby. EX1006 at Fig. 2.

115. Hsieh addresses the problem of connecting two dual-role devices by initializing the dual-role device in either sink or source mode. EX1008 at [0006]. If the attached device has the same function (i.e., both are sources or both are sinks), the HSDI transceiver “is unable to detect the plugged-in...HSDI device.” *Id.* at [0017]. To overcome this issue, the HSDI transceiver may toggle its function to “act as the source device and the sink device alternately” in order to match with and connect to the attached device. *Id.* at [0017], [0020].

116. A POSITA would have been motivated to modify Iwamoto in view of Hsieh to implement the default sink mode and toggling features of Hsieh in the device of Iwamoto, so that two dual-role Iwamoto devices can detect each other and connect—a situation that is not explicitly contemplated by Iwamoto. A POSITA also would have been motivated by Hsieh’s teachings to change the default mode of Iwamoto’s device based on whether the particular device is typically a source (i.e., DVD recorder with DVR functionality) or a sink (i.e., a monitor), for efficiency purposes. EX1008 at [0002], [0016] (explaining that when the dual role device is a DVD recorder (usually a source), it defaults to source mode). Such a modification reflects a simple substitution of one known element for another to obtain predictable results. This straightforward modification also reflects the application of a known technique (e.g., defaulting to source/sink and subsequently toggling between source/sink) to improve a similar device (e.g., Iwamoto’s dual-role HDMI device)

in the same way (e.g., to enable the device to connect to another dual-role device) to yield predictable results.

117. A POSITA would have had a reasonable expectation of success in making the above modifications because each reference teaches HDMI compliant source/sink swapping devices. Both devices comply with the HDMI 1.3a standard—the relevant standard when the references were filed—and are intended to be interoperable with other HDMI-compliant devices. The HDMI 1.3a standard also governs the properties of HDMI sinks and sources, so Iwamoto’s device in sink mode should have the same features as Hsieh’s device in sink mode.

2. Claims 1, 8, and 14

118. Claims 1, 4-5, 8, 11, and 14-16 are obvious over Iwamoto, as discussed in Ground 1. *Supra* Section X.A. To the extent that Patent Owner were to incorrectly argue that Iwamoto does not disclose a “default AV sink operation mode,” as recited in claims 1, 8, and 14, that limitation is obvious over Iwamoto in view of Hsieh. The mapping for all other claim limitations is as set forth in Ground 1. *Supra* Section X.A.

a. “initializing a first audio/video (AV) device to operate in a default AV sink operation mode in response to a power-on-reset or powering up of the first AV device;” 1[a]

119. Iwamoto teaches that, when VL1 and VL2 are low, the dual-purpose device operates in a default standby mode. *Id.* at [0043]-[0044], [0072]-[0073], Figs.

2-3. As explained with reference to limitation 1[a] in Ground 1, a POSITA would have understood that Iwamoto's "standby" mode is "a default AV sink operation mode," per the meaning of that term in the '265 Patent. *Supra* Section X.A.1.b; EX1006 at [0043]-[0045], [0052], [0062], [0072]-[0076], Figs. 2-3; EX1001 at 9:26-30, Fig. 4A.

120. However, even if it were incorrectly argued that Iwamoto's "standby" mode is not "a default AV sink operation mode," it would have been obvious to a POSITA to replace the default standby mode taught by Iwamoto with the default sink mode taught by Hsieh. *Supra* Section X.B.1. Hsieh explains that "the first HSDI transceiver is pre-set to be either the source device or the sink device prior [to] receiving or generating a first control switching command." EX1008 at [0006], [0016]; *see also* [0020] ("Initially, each device is set to be the default working function, Source or sink function."). Hsieh further teaches that the device "can be chosen to act as a source device or a sink device depending on the user's requirement." *Id.* at [0006], [0016].

b. "the AV sink operation mode being a default mode of operation for the AV device, and" 8[a.1.ii]

121. For the same reasons explained above with respect to limitation 1[a] in Ground 2, Iwamoto in view of Hsieh teaches limitation 8[a.1.ii]. *Supra* Section X.B.2.a; *see* EX1006 at [0043]-[0045], [0052], [0062], [0072]-[0076], Figs. 2-3; EX1001 at 9:26-30, Fig. 4A; EX1008 at [0006], [0016], [0020].

c. “the AV sink operation mode being a default mode of operation for the system, and” 14[b.1]

122. For the same reasons explained above with respect to limitation 1[a] in Ground 2, Iwamoto in view of Hsieh teaches limitation 14[b.1]. *Supra* Section X.B.2.a; *see* EX1006 at [0043]-[0045], [0052], [0062], [0072]-[0076], Figs. 2-3; EX1001 at 9:26-30, Fig. 4A; EX1008 at [0006], [0016], [0020].

C. Ground 3: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over Iwamoto in Combination with Knight

123. In my opinion, Iwamoto in combination with Knight renders obvious claims 1, 4-5, 8, 11, and 14-16 of the '265 Patent.

1. Motivation to Combine Iwamoto and Knight.

124. To the extent that Patent Owner argues that claims 1, 4-5, 8, 11, and 14-16 of the '265 Patent are not taught by Iwamoto alone, claims 1, 4-5, 8, 11, and 14-16 are also obvious over Iwamoto in view of Knight. As explained in Section IX.C, Knight discloses a device “capable of communicating power and data through a single connector to another device” via PoE, Firewire, USB, or similar communication protocols, where the device may be configured as a source or sink. EX1007 at [0024], [0031]-[0032], [0001], [0024], [0039]-[0040]. When the devices’ “connector interfaces...are able to both sink and source power, a remote device may be able to supply power for a period of time, during which the battery bank 126 may be charged. The same remote device may then switch to a mode where the remote

device can no longer source power but requires the device 102 to source power” from battery 126. *Id.* at [0030].

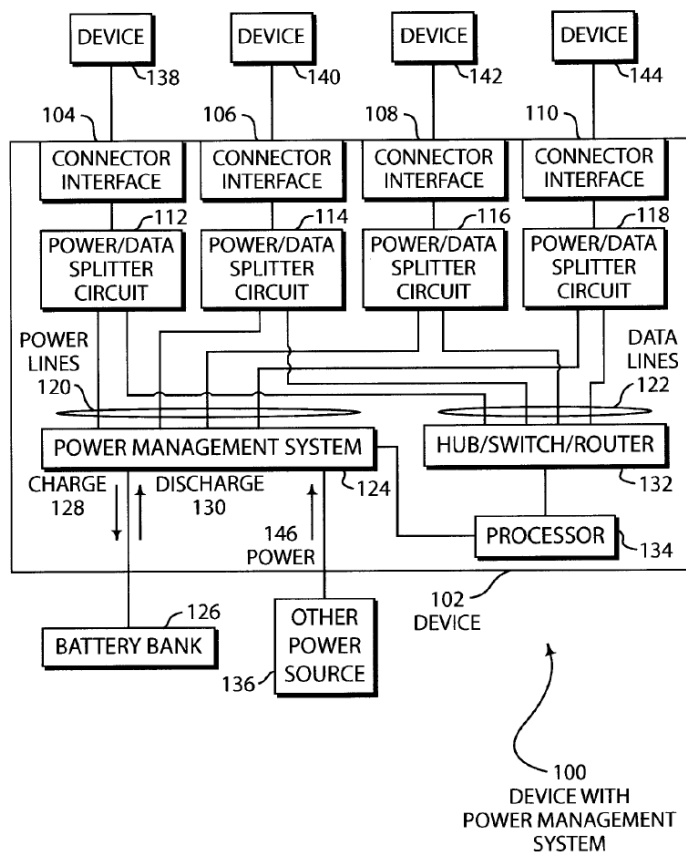


FIG. 1

Id. at Fig. 1.

125. The power management system 124 may control the flow of power in the system via the method for power management 200 illustrated in Fig. 2. EX1007 at [0039], Fig. 2. According to that method, when a connection is made, the device may “first attempt[] to connect as a power source, then attempt[] to connect as a power sink if the power source attempt fails.” *Id.* at [0048]. Alternatively, the device “may be configured to attempt to connect as a power sink initially, then attempts as

a power source secondarily.” *Id.* The sink/source negotiation process “may be through sensing status and communicating through the power connections.” *Id.* at [0047]. “One example of such communication may be for a device to configure a specific resistance along the power connections to indicate that it may sink power,” in which case “the connecting device may sense the resistance and then begin supplying power to the first device.” *Id.*

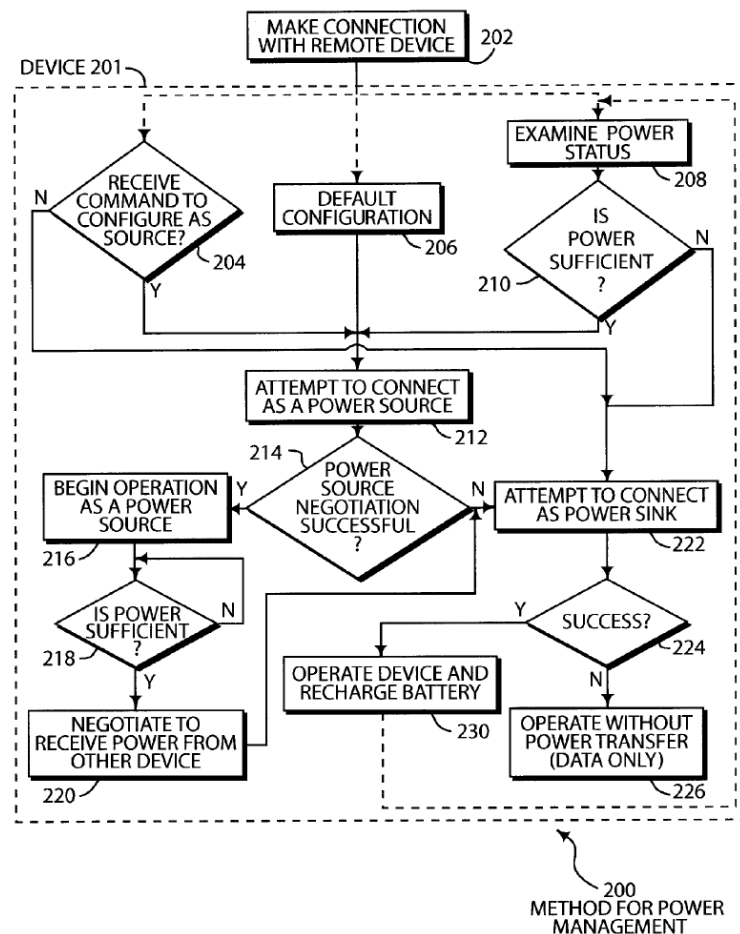


FIG. 2

Id. at Fig. 2.

126. Unlike Knight, Iwamoto does not account for the situation where a first dual-role device connects with a second dual-role device. Iwamoto also is silent as to what would occur if a first dual-role device in standby is connected to a second dual-role device in standby. If Iwamoto's dual-role device in standby outputs low VL1 and VL2 values (because it does not provide 5 V on the power line of the HDMI connector or 3.3 V on the TMDS line of the connector), then two connected dual-role devices would likely remain in standby. EX1006 at Fig. 2. As discussed in further detail below, Knight addresses this problem by having the device first attempt to connect as a sink or source, and then trying the other mode if that fails.

127. A POSITA would have been motivated to modify Iwamoto in view of Knight to implement the default sink mode of Knight in the device of Iwamoto, so that two dual-role Iwamoto devices can detect each other and connect—a situation that is not explicitly contemplated by Iwamoto. A POSITA also would have had a reasonable expectation of success in doing so, because (a) each reference teaches source/sink swapping AV devices; (b) Knight's invention follows PoE, Firewire, USB, or similar communication protocols that allow transfer of “power and data through a single connector;” (c) Iwamoto's invention is an HDMI compliant device; and (d) HDMI is a similar communication protocol to PoE, Firewire, and USB because it allows devices to transmit data and power through a single connector, it has explicit data and power roles with rules for those roles, and it supports “hot plug”

with appropriate safety practices. EX1007 at [0024]. A POSITA also would have been motivated by Hsieh's teachings to change the default mode of Iwamoto's device based on whether the particular device is typically a source (i.e., DVD recorder with DVR functionality) or a sink (i.e., a monitor), for efficiency purposes. EX1008 at [0002], [0016] (explaining that when the dual role device is a DVD recorder (usually a source), it defaults to source mode). Such a modification reflects a simple substitution of one known element for another to obtain predictable results. This straightforward modification also reflects the application of a known technique (e.g., defaulting to source/sink and subsequently toggling between source/sink) to improve a similar device (e.g., Iwamoto's dual-role HDMI device) in the same way (e.g., to enable the device to connect to another dual-role device) to yield predictable results.

2. Claims 1, 8, and 14

128. Claims 1, 4-5, 8, 11, and 14-16 are obvious over Iwamoto, as discussed in Ground 1. *Supra* Section X.A. To the extent that Patent Owner argues that Iwamoto does not disclose a "default AV sink operation mode," as recited in claims 1, 8, and 14, that limitation is obvious over Iwamoto in view of Knight.

a. “initializing a first audio/video (AV) device to operate in a default AV sink operation mode in response to a power-on-reset or powering up of the first AV device;” 1[a]

129. To the extent that Patent Owner argues that Iwamoto does not explicitly disclose a “default AV sink operation mode,” that feature is obvious over Iwamoto in view of Knight. Iwamoto teaches that, when VL1 and VL2 are low, the dual-purpose device operates in a default standby mode. EX1006 at [0043]-[0044], [0072]-[0073], Figs. 2-3. As explained with reference to limitation 1[a] in Ground 1, a POSITA would have understood that Iwamoto’s “standby” mode is “a default AV sink operation mode,” based on the teachings of the ’265 Patent. *Supra* Section X.A.1.b; EX1001 at 9:26-30, Fig. 4A. However, even if Patent Owner argues that Iwamoto’s “standby” is not “a default AV sink operation mode,” it would have been obvious to a POSITA to replace the default standby mode taught by Iwamoto with the default sink mode taught by Knight. EX1007 at [0048]; *supra* Section X.C.1. Knight teaches that, when a connection is made, the dual-role device may “first attempt[] to connect as a power source, then attempt[] to connect as a power sink if the power source attempt fails.” EX1007 at [0048]. Alternatively, the device “may be configured to attempt to connect as a power sink initially, then attempts as a power source secondarily.” *Id.*

b. “the AV sink operation mode being a default mode of operation for the AV device, and” 8[a.1.ii]

130. For the same reasons explained above with respect to limitation 1[a] in Ground 3, Iwamoto in view of Knight teaches limitation 8[a.1.ii]. *Supra* Section X.C.2.a; *see* EX1006 at [0043]-[0045], [0052], [0062], [0072]-[0076], Figs. 2-3; EX1001 at 9:26-30, Fig. 4A; EX1007 at [0048].

c. “the AV sink operation mode being a default mode of operation for the system, and” 14[b.1]

131. For the same reasons explained above with respect to limitation 1[a] in Ground 3, Iwamoto in view of Knight teaches limitation 14[b.1]. *Supra* Section X.C.2.a; *see* EX1006 at [0043]-[0045], [0052], [0062], [0072]-[0076], Figs. 2-3; EX1001 at 9:26-30, Fig. 4A; EX1007 at [0048].

D. Ground 4: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over Hsieh in Combination with Iwamoto

132. In my opinion, Hsieh in combination with Iwamoto renders obvious claims 1, 4-5, 8, 11, and 14-16 of the '265 Patent.

1. Motivation to Combine Hsieh and Iwamoto

133. Claims 1, 4-5, 8, 11, and 14-16 are also obvious over Hsieh in view of Iwamoto. As explained in Section IX.B and below, Hsieh teaches a bi-directional high speed digital interface (“HSDI”) transceiver and “a method for supplying a bi-directional communication process on a HSDI device.” EX1008 at [0001]-[0004].

Like the device of Iwamoto, the device taught by Hsieh may be HDMI compliant. *Id.* at [0016].

134. Hsieh further explains that the “HSDI transceiver with bi-directional functionality can switch its function to make itself compatible to a typical HSDI source device/HSDI sink device, or form a bi-directional HSDI structure coupled with another HSDI transceiver with bi-directional functionality.” *Id.* at [0035]. In other words, like the device of Iwamoto, “the first HSDI transceiver acts as a source device if the interface is coupled to [a sink], and the first HSDI transceiver acts as a sink device if the interface is coupled to [a source].” *Id.* at [0006]. Hsieh explains that, when a device operates as a sink, it “sets the hot-plug detect pin 118 to be output pin and set[s] power pin 114 to be input pin,” and when the device operates as a source, it “set[s] the power pin 114 to supply power, and...set[s] the hot plug detect pin 118 to” input, in accordance with the HDMI specification. *Id.* at [0016], [0022]. However, Hsieh does not explicitly disclose how the device determines whether it is connected to a source or sink.

135. As explained in Ground 1, Iwamoto teaches a similar source/sink swapping HDMI system where a first device determines whether it is connected to a source or sink by measuring characteristics of HDMI source and sink devices, such as voltage signals present on the power supply line and the TMDS line connecting the devices. *Supra* Section X.A. A POSITA would have been motivated to combine

Hsieh and Iwamoto because Iwamoto provides basic source/sink detection details that are omitted from Hsieh. Moreover, a POSITA would have had a reasonable expectation of success in doing so, because each reference teaches HDMI source/sink swapping devices, and Iwamoto's source/sink detection process involves the detection of HDMI-mandated characteristics (+5V provided on the power pin by an HDMI source, and 3.3V termination voltage on the TMDS line provided by an HDMI sink) that would necessarily already be present in the devices taught by Hsieh, which are also HDMI compliant. Thus, a POSITA would have been motivated to look to implementation details such as those in Iwamoto when implementing the device of Hsieh. Furthermore, this straightforward modification simply applies a known technique (e.g., detecting source/sink status based on HDMI mandated characteristics) to improve a similar device (e.g., Hsieh's source/sink swapping HDMI device) in the same way (e.g., adding the HDMI source/sink status detection of Iwamoto to the HDMI device of Hsieh) to yield predictable results.

2. Claim 1

a. "A method comprising:" 1[P]

136. To the extent the preamble is limiting, Hsieh teaches this limitation. Specifically, Hsieh discloses a bi-directional high speed digital interface ("HSDI") transceiver and "a method for supplying a bi-directional communication process on a HSDI device." EX1008 at [0001]-[0004].

b. “initializing a first audio/video (AV) device to operate in a default AV sink operation mode in response to a power-on-reset or powering up of the first AV device;” 1[a]

137. Hsieh teaches this limitation. Hsieh explains that the “HSDI transceiver with bi-directional functionality can switch its function to make itself compatible to a typical HSDI source device/HSDI sink device, or form a bi-directional HSDI structure coupled with another HSDI transceiver with bi-directional functionality.” *Id.* at [0035]. Hsieh further teaches that “the first HSDI transceiver is pre-set to be either the source device or the sink device prior [to] receiving or generating a first control switching command.” *Id.* at [0006], [0016]. In other words, “[i]nitially, each device is set to be the default working function, Source or sink function.” *Id.* at [0020]. The “settings of the power pin 114 and the hot plug detect pin 118, and the connection relationships of the first multiplexer 106 and the second multiplexer 112 of the HSDI transceiver 100 are pre-set...[according to] the standard for HSDI device, such as HDMI specification,” depending on the pre-set default function. *Id.* at [0016].

138. The device “can be chosen to act as a source device or a sink device depending on the user’s requirement.” *Id.* at [0006], [0016]. For example, when the HSDI transceiver is a DVD recorder (typically used as a source), “the default setting of the first multiplexer 106 is to couple to the transmitter 102, the default setting of the second multiplexer 112 is to couple to the controller 108, the controller 108

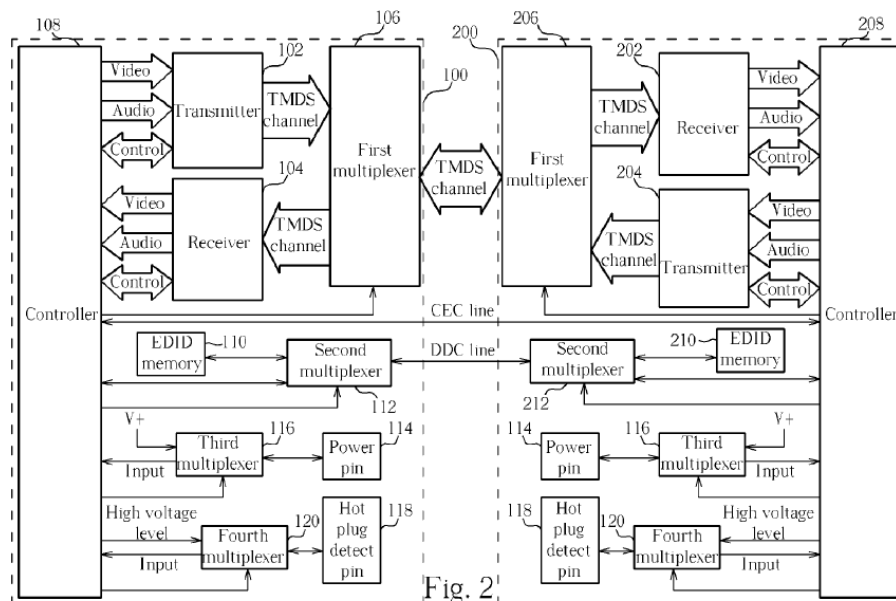
controls the third multiplexer 116 to set the power pin 114 to supply power, and controls the fourth multiplexer 120 to set the hot plug detect pin 118 to become an input node.” *Id.* at [0016].

139. As explained in Section X.A.1.b, a POSITA would have understood that a bi-directional device that is compatible with HDMI would generally include power-on-reset (“POR”) means to initialize the device to predetermined settings when it is powered on. A POSITA would have further understood that when the device is reset or powered up, this occurs “prior [to] receiving or generating a first control switching command.” EX1020 (“The basic POR function...keep[s] the device static until the supply voltage reaches a threshold that guarantees correct operation....Until initialization is complete, the device should ignore external signals.”). A POSITA also would have understood that a device that is “initially” set to a default working function is first set to that function when the device is powered-up or reset. Accordingly, a POSITA would have understood that Hsieh teaches initializing the device as a sink upon reset or power-up.

140. To the extent that Patent Owner argues that the default on power-up portion of this limitation is not taught by Hsieh alone, this limitation is disclosed by Iwamoto. Specifically, Iwamoto teaches that the dual-purpose source/sink device initializes to a default mode “when power is turned on and the operation of the source/sink dual-purpose device 100 is started.” EX1006 at Fig. 3, [0062].

c. “detecting with control circuitry of the first AV device, a coupling between the first AV device and a second AV device;” 1[b]

141. Hsieh teaches this limitation. Hsieh discloses that the device includes circuitry for “detect[ing] the plugged-in specific HSDI device.” EX1008 at [0018]; *see also* [0017]. Specifically, Hsieh teaches that “[w]hen the HSDI transceiver 100 is connected to a specific HSDI device, it will trigger the detection process to determine whether the specific HSDI device is plugged in according to a communication procedure specified in the specification for a variety of HSDI devices, such as HDMI. Since such a communication procedure can be appreciated by a person skilled in this art, the detailed description is omitted here for the brevity.” *Id.* at [0017], Fig. 2.



Id. at Fig. 2.

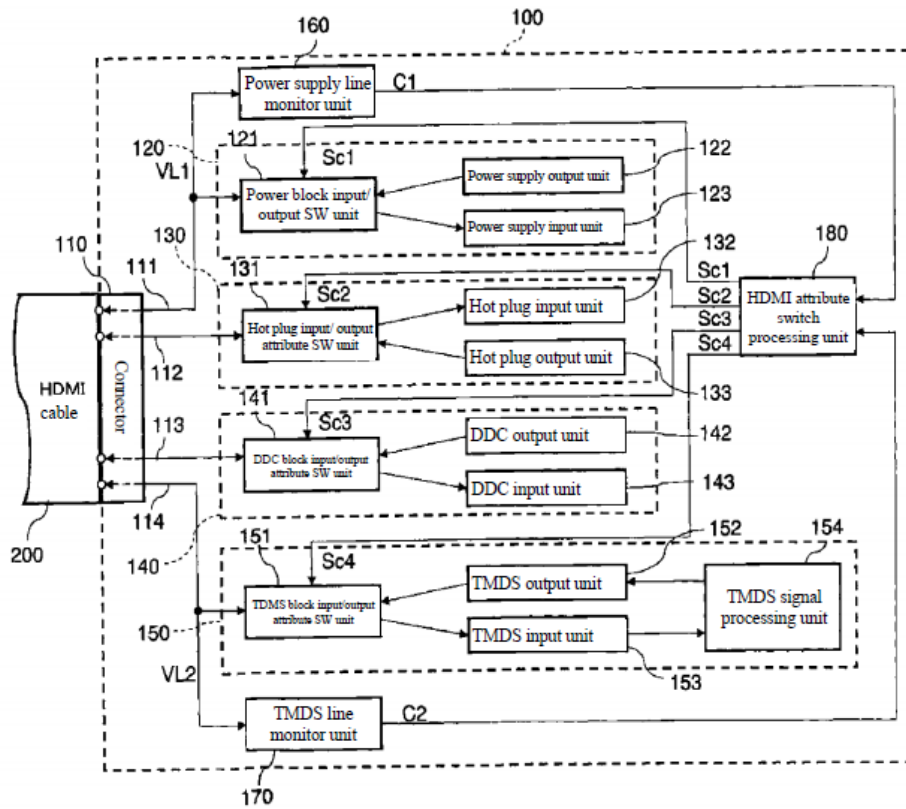
d. “determining whether a first supply voltage is provided at a channel of a connector, the connector coupling the first AV device and the second AV device;” 1[c]

142. Hsieh in view of Iwamoto discloses this limitation. Hsieh explains that “the first HSDI transceiver acts as a source device if the interface is coupled to [a sink], and the first HSDI transceiver acts as a sink device if the interface is coupled to [a source].” EX1008 at [0006]. Hsieh further explains that, when a device operates as a sink, it “sets the hot-plug detect pin 118 to be output pin and set[s] power pin 114 to be input pin,” and when a device operates as a source, it “set[s] the power pin 114 to supply power, and...set[s] the hot plug detect pin 118 to” input, in accordance with the HDMI specification. *Id.* at [0016], [0022]. Although Hsieh does not explain how the first device determines whether the connected device is a source or a sink, Hsieh notes that this is a well-known process. *Id.* at [0017].

143. In addition, as explained in Ground 1, Iwamoto teaches a similar source/sink swapping HDMI system where a first device determines whether it is connected to a source or sink by measuring characteristics of HDMI source and sink devices, such as voltage signals present on the power supply line and the TMDS line connecting the devices. *Supra* Sections X.A.1.b-X.A.1.c. More particularly, Iwamoto discloses that the dual-purpose device includes a first voltage level monitor for detecting the voltage level of the power channel 111 of an HDMI compliant connector 110 (VL1), and a second voltage level monitor for detecting the voltage

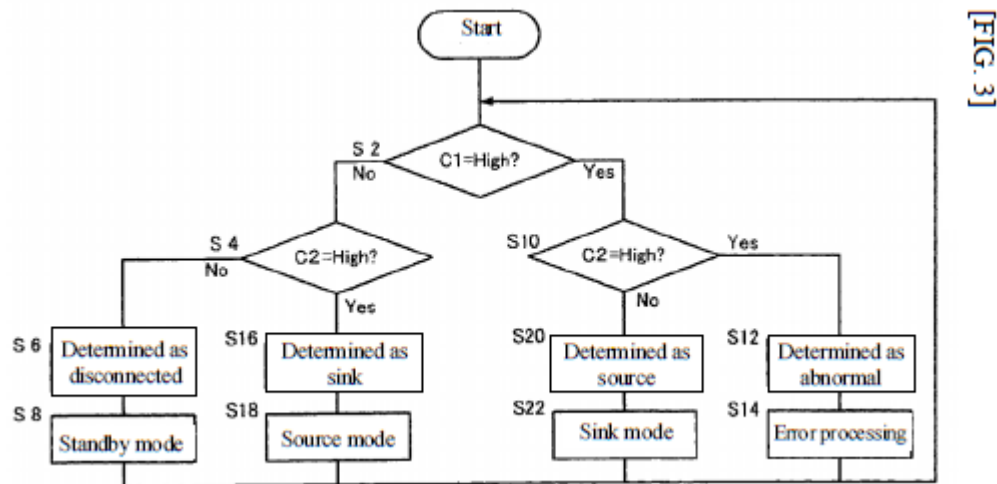
level of a TMDS_CLK line of the HDMI cable (VL2). EX1006 at [0016], Fig. 1. The dual-purpose device uses these measurements to determine whether a connected device is a source or a sink, and to “automatically switch[] its own functions” accordingly. *Id.* at [0016], [0026]. For example, when VL1 is high (5 V) and VL2 is low, the dual-purpose device determines that the connected device is a source and operates in sink mode. *Id.* at [0043]-[0045], [0075], [0076], Figs. 2-3. When VL1 is low and VL2 is high (3.3 V), the dual-purpose device determines that the connected device is a sink and operates in source mode. *Id.* As explained above, it would have been obvious to a POSITA to implement the detection scheme of Iwamoto in the device of Hsieh, in order to detect whether a connected device is an HDMI source or sink. *Supra* Section X.D.1.

[FIG. 1]



[FIG. 2]

C1	C2	J	M	Sc	
Power line level	TMDS CLK line level	External device function determination	Operation mode determination	Control Signal	
Low	Low	Disconnected	Standby	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
High	High	Error	Shunt	Sc1	High Impedance
				Sc2	High Impedance
				Sc3	High Impedance
				Sc4	High Impedance
Low	High	Sink	Source	Sc1	Power supply output unit
				Sc2	Hot plug input unit
				Sc3	DCC output unit
				Sc4	TMDS output unit
High	Low	Source	Sink	Sc1	Power supply input unit
				Sc2	Hot plug output unit
				Sc3	DDC input unit
				Sc4	TMDS input unit



EX1006 at Figs. 1-3.

e. “in response to determining that the first supply voltage is provided at the channel of the connector, configuring communication logic of the first AV device to continue operating the first AV device in the AV sink operation mode;” 1[d]

144. Hsieh in view of Iwamoto also teaches this limitation. Hsieh discloses that the device is pre-set to sink mode, and that the device operates as a sink if a source is connected and operates as a source if a sink is connected. EX1008 at [0006], [0016], [0020].

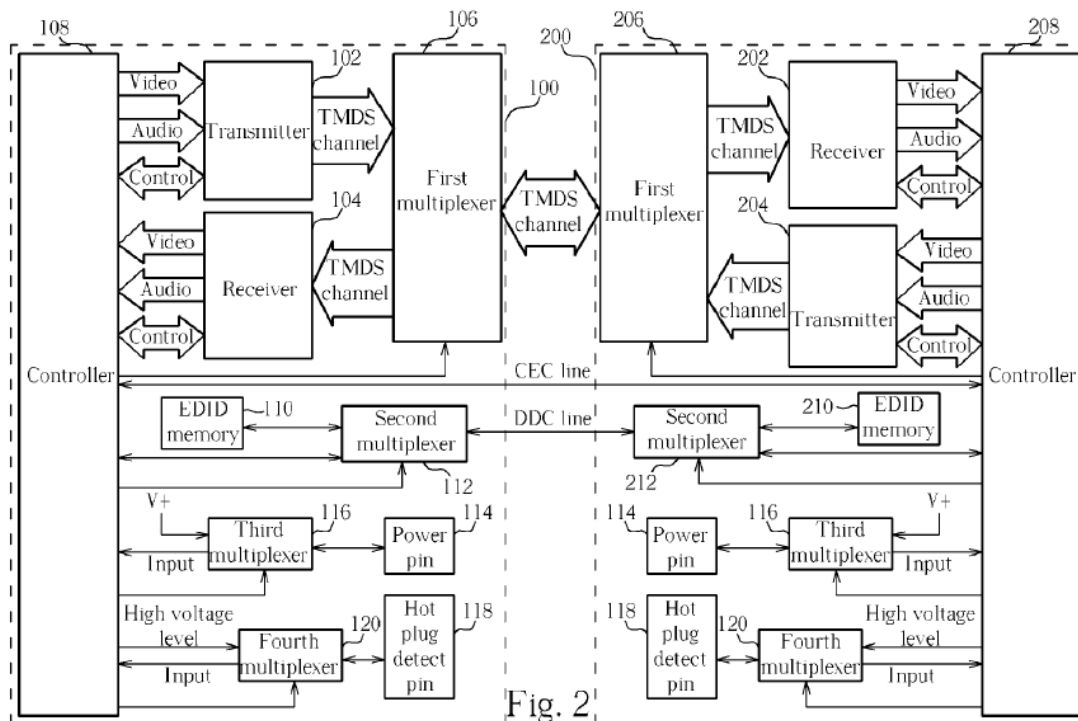
145. Iwamoto teaches that, in response to determining that the first supply voltage VL1 is provided at the connector (i.e., C1 is high) and the second voltage VL2 at the TMDS CLK line is low (i.e., C2 is low), the device determines that it is connected to a source and should operate in sink mode. EX1006 at Fig. 2, [0063]-[0064], [0070]. The HDMI attribute switch processing unit 180 sends control signals sc1-sc4 to communication logic comprising power supply block 120, DDC block

140, hot plug block 130, and TMDS block 150 instructing the device to operate in AV sink operation mode. *Id.* at [0056], [0033]. Specifically, when the device is in sink mode, Sc1 switches the power supply block 120 to input, Sc2 switches the hot plug block 130 to output, Sc3 switches the DCC block 140 to input, and Sc4 switches the TMDS block 150 to input. *Id.* at [0033].

146. Accordingly, in response to determining that a first supply voltage is provided by a connected source, the device taught by Hsieh as modified by Iwamoto, which is pre-set to sink mode, continues operating as a sink.

f. “when operating the first AV device in the AV sink operation mode, receiving AV data provided to the first AV device via the connector and receiving power from the first supply voltage provided to the first AV device at the channel of the connector;” 1[e]

147. Hsieh also teaches this limitation. Hsieh discloses that, when in sink mode, the device “couple[s] the second multiplexer 112 to the EDID memory 110, set[s] the hot-plug detect pin 118 to be output pin and set power pin 114 to be input pin,” so that the device can receive power from the source. EX1008 at [0022]. The first multiplexer will also couple to receiver 104, which receives a data stream from the source and “is substantially the same as a receiver in a conventional HSDI sink device.” *Id.* at [0015]. The device receives data over the TMDS channel illustrated in Fig. 2, below. *Id.* at [0020], Fig. 2.



Id. at Fig. 2.

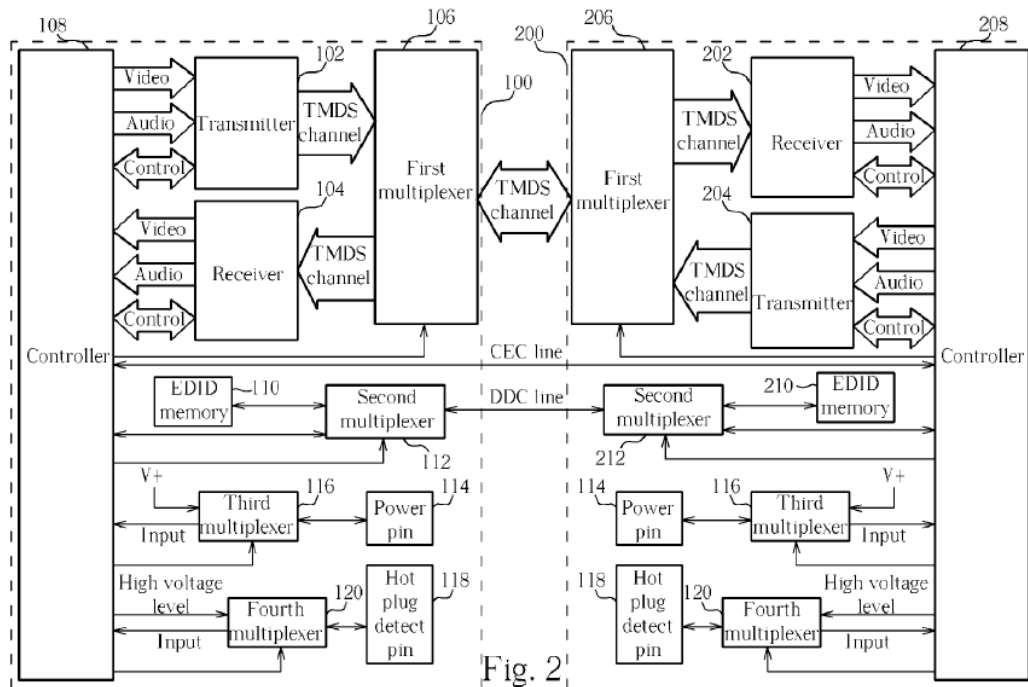
g. “in response to determining that the first supply voltage is not provided at the channel of the connector, configuring the communication logic of the first AV device to transition the first AV device from the AV sink operation mode to an AV source operation mode; and” 1[f]

148. Hsieh in view of Iwamoto also teaches this limitation. Hsieh discloses that the device is pre-set to sink mode, and that the device operates as a sink if a source is connected and operates as a source if a sink is connected. EX1008 at [0006], [0016], [0020]. Iwamoto teaches that, in response to determining that the first supply voltage VL1 is not provided at the connector (i.e., C1 is low) and the second voltage VL2 at the TMDS CLK line is high (i.e., C2 is high), the device determines that it is connected to a sink and should operate in source mode. EX1006

at Fig. 2, [0063]-[0064], [0068]. The HDMI attribute switch processing unit 180 sends control signals sc1-sc4 to communication logic comprising power supply block 120, DDC block 140, hot plug block 130, and TMDS block 150 instructing the device to operate in AV source operation mode. *Id.* at [0056], [0033]. Accordingly, in response to determining that a first supply voltage is not provided on the power line of the connector, and the TMDS_CLK line is high, the device taught by Hsieh as modified by Iwamoto, which is pre-set to sink mode, switches to source mode.

h. “when operating the first AV device in the AV source operation mode, sending AV data via the connector and providing a second supply voltage at the channel of the connector.” 1[g]

149. Hsieh teaches this limitation. Hsieh discloses that, when in source mode, the device’s multiplexer couples to transmitter 102 for transmitting AV data, which is “substantially the same as a transmitter in a conventional HSDI source device.” EX1008 at [0015], [0020]. The device sends data over the TMDS channel illustrated in Fig. 2, below. *Id.* at [0020], Fig. 2. The power pin is also set to output, so that the source can supply power to another device. *Id.* at cl. 11, [0016].



Id. at Fig. 2.

3. Claim 4: “The method of claim 1, further comprising: performing an AV data exchange between the first device and the second device.”

150. For the same reasons explained above with respect to limitations 1[e] and 1[g] in Ground 4, Hsieh in view of Iwamoto teaches claim 4. *Supra* Sections X.D.2.f and X.D.2.h; *see* EX1008 at [0015], [0020], [0022], [0016], cl. 11, Fig. 2.

4. Claim 5

a. “The method of claim 4, further comprising: detecting a change to the connectivity of the first AV device after the AV data exchange; and” 5[a]

151. Hsieh also teaches this limitation. Hsieh explains that when the device is connected to another HSDI device and “detects the plugged-in specific HSDI device,” this triggers a detection process. EX1008 at [0017]. After determining that

the connected device supports bi-directional functionalities, the first multiplexers of the devices are connected “to transport the HSDI signals bi-directionally between” them. *Id.* at [0020]. The device may also detect “the non-detection of plug-in status,” which occurs if the HSDI device is not connected or not completely connected. *Id.* Hsieh teaches that the device “will return to its default settings after the connection is terminated.” *Id.* at [0034].

b. “in response to the detected change to the connectivity, placing the communication logic into the AV sink operation mode.” 5[b]

152. Hsieh also teaches this limitation. Hsieh discloses that “the first HSDI transceiver is pre-set to be either the source device or the sink device prior [to] receiving or generating a first control switching command.” EX1008 at [0006], [0016]; *see also* [0020] (“Initially, each device is set to be the default working function, Source or sink function.”). Hsieh further teaches that the device “will return to its default settings after the connection is terminated.” *Id.* at [0034].

5. Claim 8

a. “An audio/video (AV) device comprising:” 8[p]

153. To the extent the preamble is limiting, Hsieh teaches this limitation. Specifically, Hsieh discloses a bi-directional high speed digital interface (“HSDI”) transceiver and “a method for supplying a bi-directional communication process on a HSDI device.” EX1008 at [0001]-[0004].

b. “communication logic to couple to a connector, the communication logic including circuitry configured to implement.” 8[a]

154. For the same reasons explained above with respect to Ground 4 limitations 1[c] and 1[d], Hsieh in view of Iwamoto teaches limitation 8[a]. *Supra* Sections X.D.2.d and X.D.2.e; *see* EX1008 at [0006], [0016], [0020], [0022], [0017]; EX1006 at [0016], [0026], [0033], [0043]-[0045], [0056], [0063]-[0064], [0070], [0075], [0076], Figs. 1-3. Specifically, Hsieh teaches that the device 100 includes communication logic with circuitry (shown below in blue) comprising first multiplexer 106 connected to transmitter 102 and receiver 104, second multiplexer 112 connected to EDID memory, third multiplexer 116 connected to the power pin 114, and fourth multiplexer 120 connected to the hot plug detect pin 118. EX1008 at Fig. 1, [0015].

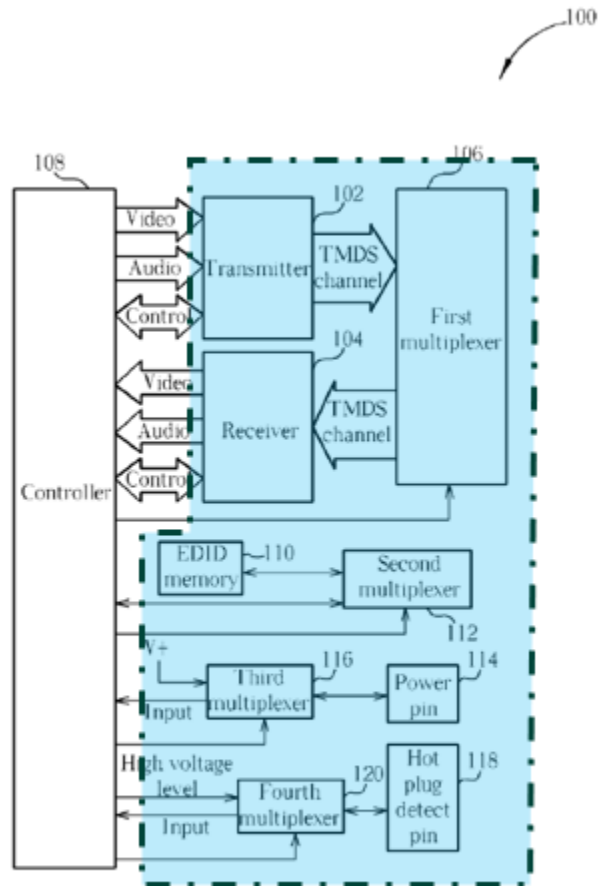


Fig. 1

Id. at Fig. 1.

155. Device 100 connects to a second device 200 via a connector with various channels, including a TMDS channel, a CEC line, and a DDC line. *Id.* at Fig. 2.

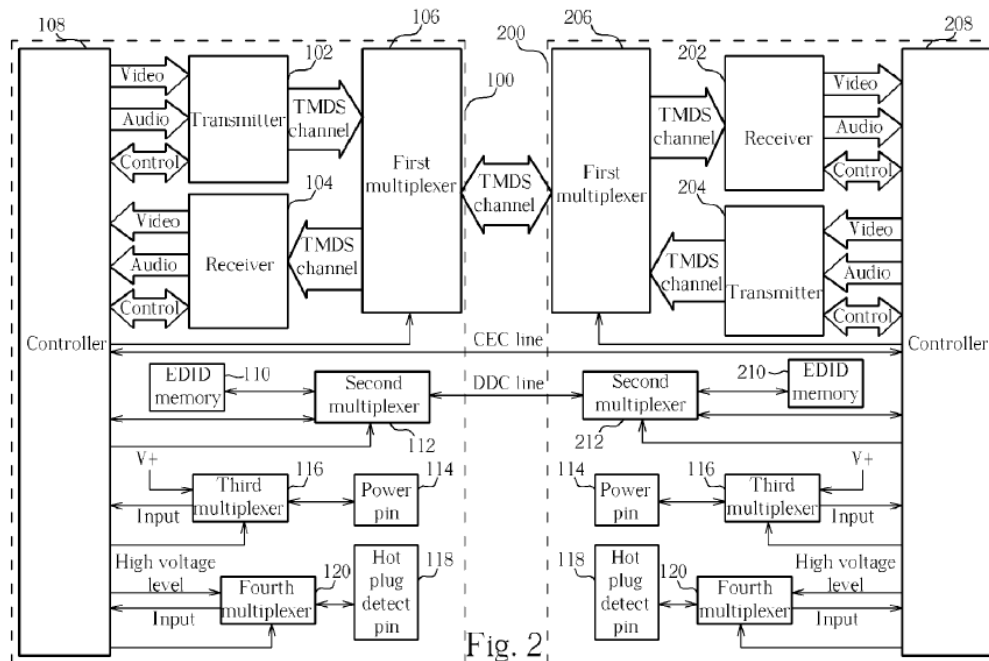


Fig. 2

Id. at Fig. 2.

c. “an AV sink operation mode for the communication logic to receive AV data provided to the AV device at the connector and to receive power from a first supply voltage provided to the AV device via a channel of the connector,” 8[a.1.i]

156. For the same reasons explained above with respect to Ground 4 limitation 1[e], Hsieh in view of Iwamoto teaches limitation 8[a.1.i]. *Supra* Section X.D.2.f; *see* EX1008 at [0022], [0015], [0020], Fig. 2.

d. “the AV sink operation mode being a default mode of operation for the AV device, and” 8[a.1.ii]

157. For the same reasons explained above with respect to Ground 4 limitation 1[a], Hsieh in view of Iwamoto teaches limitation 8[a.1.ii]. *Supra* Section X.D.2.b; *see* EX1008 at [0035], [0006], [0016], [0020]; EX1006 at [0062], Fig. 3.

e. “an AV source operation mode for the communication logic to send AV data from the AV device via the connector and to provide a second supply voltage at the channel of the connector; and” 8[a.2]

158. For the same reasons explained above with respect to Ground 4 limitation 1[g], Hsieh in view of Iwamoto teaches limitation 8[a.2]. *Supra* Section X.D.2.h; *see* EX1008 at [0015], [0020], [0016], cl. 11, Fig. 2.

f. “control logic including circuitry to configure the communication logic to initialize the AV device to operate in the default AV sink operation mode in response to a power-on-reset or powering up of the AV device,” 8[b.1]

159. For the same reasons explained above with respect to Ground 4 limitation 1[a], Hsieh in view of Iwamoto teaches limitation 8[b.1]. *Supra* Section X.D.2.b; *see* EX1008 at [0035], [0006], [0016], [0020]; EX1006 at [0062], Fig. 3. Hsieh further teaches that the device 100 includes control logic within controller 108 (highlighted below in orange) for controlling multiplexers 106, 112, 116, and 120 of the communication logic (highlighted below in blue) to swap between source and sink modes. EX1008 at [0015], Fig. 1. For example, “[t]he first multiplexer 106 is controlled by the controller 108 to be selectively coupled to the transmitter 102 or the receiver 104 to let the HSDI transceiver 100 act as a source device or a sink device respectively. *Id.*

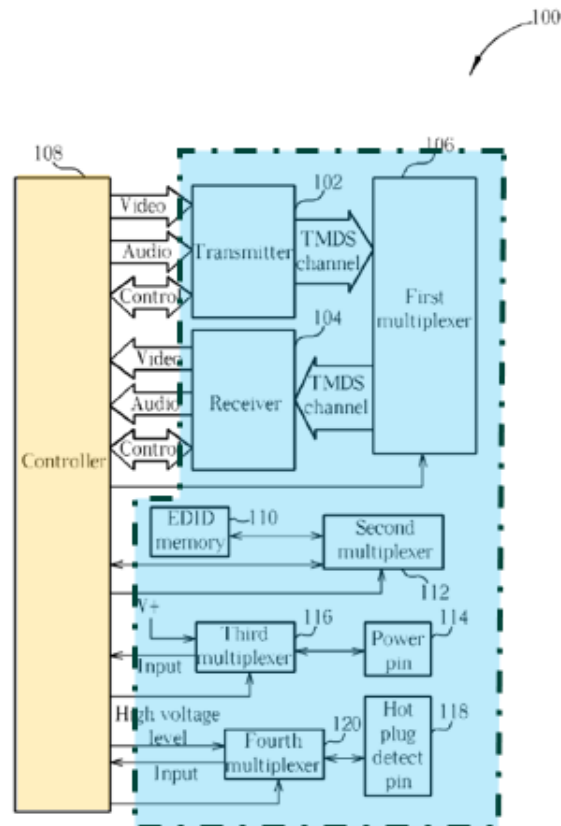


Fig. 1

Id. at Fig. 1.

g. “ to continue operating the AV device in the AV sink operation mode in response to determining that the first supply voltage is provided at the channel of the connector, and to configure the communication logic to transition the AV device from the AV sink operation mode to the AV source operation mode in response to determining that the first supply voltage is not provided at the channel of the connector.” 8[b.2]

160. For the same reasons explained above with respect to Ground 4 limitations 1[c], 1[d], and 1[f], Hsieh in view of Iwamoto teaches limitation 8[b.2]. *Supra* Sections X.D.2.d, X.D.2.e, and X.D.2.g; *see* EX1008 at [0006], [0016],

[0020], [0022], [0017]; EX1006 at [0016], [0026], [0033], [0056], [0043]-[0045], [0063]-[0064], [0068], [0070], [0075], [0076], Figs. 1-3.

6. Claim 11

a. “The device of claim 8, further comprising: detector logic to detect, while the communication logic is in the default operation mode, a coupling of the AV device to another AV device via the connector; and” 11[a]

161. For the same reasons explained above with respect to Ground 4 limitation 1[b], Hsieh in view of Iwamoto teaches limitation 11[a]. *Supra* Section X.D.2.c; *see* EX1008 at [0017]-[0018], Fig. 2.

b. “wherein the communication logic is further configured to perform an AV data exchange with the other device in response to the detection.” 11[b]

162. For the same reasons explained above with respect to Ground 4 limitations 1[g] and 1[e], Hsieh in view of Iwamoto teaches limitation 11[b]. *Supra* Sections X.D.2.f and X.D.2.h; *see* EX1008 at [0015], [0020], [0022], [0016], cl. 11, Fig. 2.

7. Claim 14

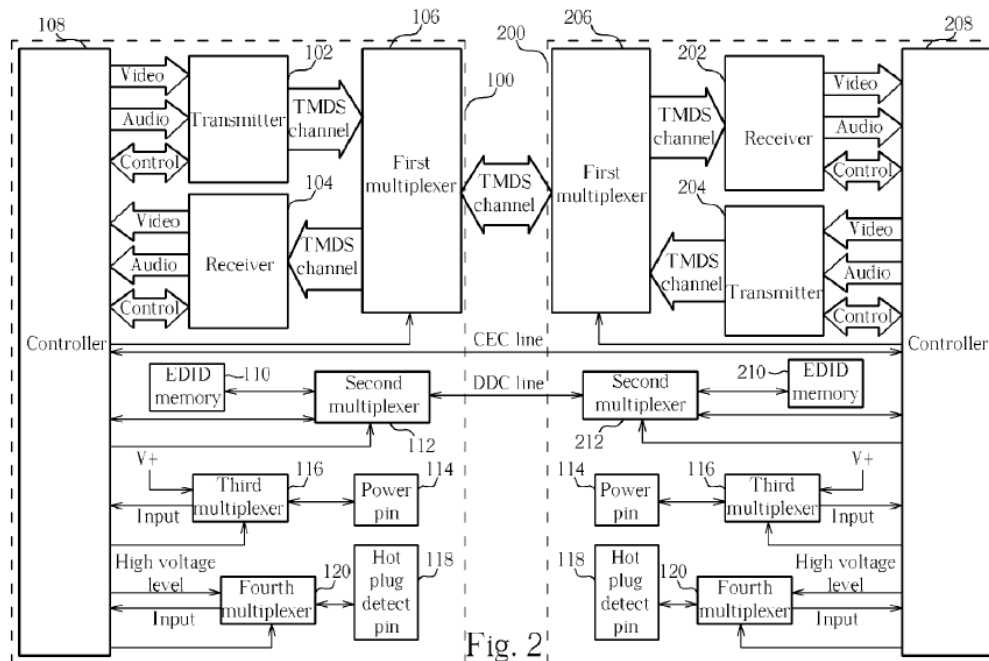
163. Claim 14 is similar to claim 8, with the only differences being the preamble (14[p]) and the addition of a connector (14[a]). As discussed below, Hsieh in view of Iwamoto discloses limitations 14[p] and 14[a]. The remaining limitations of claim 14 are disclosed by Hsieh in view of Iwamoto for the reasons explained above with respect to claim 8. *Supra* Section X.D.5.

a. “A system comprising:” 14[p]

164. To the extent the preamble is limiting, Hsieh in view of Iwamoto discloses this limitation. For the same reasons explained above with respect to Ground 4 limitations 1[p] and 8[p], Hsieh in view of Iwamoto teaches limitation 14[p]. *Supra* Sections X.D.2.a and X.D.5.a; *see* EX1008 at [0001]-[0004].

b. “a connector;” 14[a]

165. For the same reasons explained above with respect to Ground 4 limitations 1[c] and 8[a], Hsieh in view of Iwamoto teaches limitation 14[a]. *Supra* Sections X.D.2.d and X.D.5.b; *see* EX1008 at [0006], [0015], [0016], [0020], [0022], [0017], Figs. 1-2; EX1006 at [0016], [0026], [0033], [0043]-[0045], [0056], [0063]-[0064], [0070], [0075], [0076], Figs. 1-3. Specifically, Hsieh teaches that Device 100 connects to a second device 200 via a connector with various channels, including a TMDS channel, a CEC line, and a DDC line. EX1008 at Fig. 2.

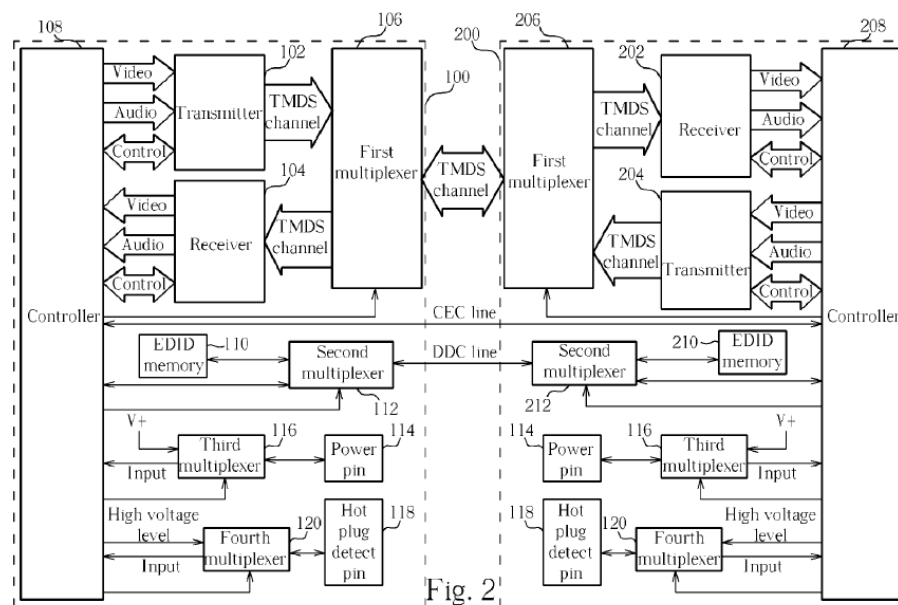


Id. at Fig. 2.

8. Claim 15: “The system of claim 14, further comprising: detector logic to detect, while the communication logic is in the default operation mode, a coupling of the system to an AV device via the connector; and wherein the communication logic is further configured to perform an AV data exchange with the AV device in response to the detection.”

166. For the same reasons explained above with respect to Claim 11 and limitations 8[a.1.i] and 8[a.2], Hsieh in view of Iwamoto teaches Claim 15. *Supra* Sections X.D.6, X.D.5.c, and X.D.5.e. Hsieh discloses that “the first HSDI transceiver is pre-set to be either the source device or the sink device prior [to] receiving or generating a first control switching command.” EX1008 at [0006], [0016], [0020]. Hsieh further explains that the device includes circuitry (the claimed “detector logic”) for “detect[ing] the plugged-in specific HSDI device.” EX1008 at

[0018], [0017]. Specifically, “[w]hen the HSDI transceiver 100 is connected to a specific HSDI device, it will trigger the detection process to determine whether the specific HSDI device is plugged in according to a communication procedure specified in the [HDMI] specification....Since such a communication procedure can be appreciated by a person skilled in this art, the detailed description is omitted here for the brevity.” *Id.* at [0017], Fig. 2.



Id. at Fig. 2.

167. For the same reasons explained above with respect to limitations 8[a.1.i] and 8[a.2], Hsieh in view of Iwamoto further teach that the communication logic is configured to exchange AV data with the connected device after the detection process. *Supra* Sections X.D.5.c, and X.D.5.e; EX1008 at [0016], [0022], [0015], [0020], cl.11, Fig. 2. Specifically, after detecting the connected device and

determining that it supports bi-directional functionalities, the first multiplexers of the devices are connected “to transport the HSDI signals bi-directionally between” them. EX1008 at [0020].

9. Claim 16: “The system of claim 15, wherein the detector logic is further configured to detect a change to the connectivity after the AV data exchange, wherein, in response to the detected change to the connectivity, the control logic further configured to place the communication logic into the AV sink operation mode.”

168. Hsieh in view of Iwamoto teaches Claim 16. Hsieh discloses that the device may also detect “the non-detection of plug-in status,” which occurs if the HSDI device is not connected or not completely connected. *Id.* at [0017]. Hsieh teaches that the device “will return to its default settings after the connection is terminated.” *Id.* at [0034].

E. Grounds 5-8: Claims 1, 4-5, 8, 11, and 14-16 are Obvious Over the References in Any of Grounds 1-4 in Further Combination with HDMI 1.3a

169. To the extent that Patent Owner argues that claims 1, 4-5, 8, 11, and 14-16 of the '265 Patent are not taught by Iwamoto alone (Ground 1), Iwamoto in view of Hsieh (Ground 2), Iwamoto in view of Knight (Ground 3), or Hsieh in view of Iwamoto (Ground 4), in my opinion, these claims are also obvious over any of the above combinations in further view of HDMI 1.3a.

1. Motivation to Combine Iwamoto (Grounds 1-3) or Hsieh (Ground 4) with HDMI 1.3a

170. As explained in Section IX.D, HDMI 1.3a discloses an interface for “transmitting digital television audiovisual signals from DVD players, set-top boxes and other audiovisual sources to television sets, projectors and other video displays.” EX1009 at 17. The specification describes the “[m]echanical, electrical, behavioral and protocol requirements necessary for compliance...for sources, sinks and cables.” *Id.* The HDMI 1.3a specification also teaches that HDMI sources and sinks, “upon power-up, reset, or detection of a new [] device,” default to assuming that the connected device operates under DVI 1.0 limitations. *Id.* at 152-153.

171. It would have been obvious to a POSITA to modify either Iwamoto (Grounds 1-3) or the combination of Hsieh and Iwamoto (Ground 4) in view of HDMI 1.3a to initialize the device to its default settings upon powering up or resetting the device. A POSITA would have been motivated to modify either Iwamoto or the combination of Hsieh and Iwamoto in view of HDMI 1.3a and would have had a reasonable expectation of success in doing so, because HDMI 1.3a was and remains a well-known specification for multimedia interfaces, Iwamoto and Hsieh disclose HDMI-compliant devices, and HDMI version 1.3a was the version available when Iwamoto and Hsieh were filed. EX1006 at [0001]; EX1008 at [0015]. A POSITA also would have been motivated to modify either Iwamoto or the combination of Hsieh and Iwamoto in view of HDMI 1.3a because Iwamoto and

Hsieh disclose HDMI-compliant devices, and these devices would need to have the above features to comply with the standard. Compliance with the standard would ensure that the devices taught by Iwamoto and the combination of Hsieh and Iwamoto are interoperable with other HDMI devices. Thus, to the extent that Iwamoto and Hsieh do not sufficiently describe certain HDMI-regulated features of their devices, a POSITA would have been motivated to look to the HDMI 1.3a specification for information on such features.

172. More specifically, it would have been obvious to a POSITA to initialize the devices of Iwamoto and Hsieh in default mode upon power-on or reset, based on HDMI 1.3a's disclosure concerning certain default settings at power-on or reset, discussed further below. EX1009 at 152-53. Such a modification would merely reflect the use of a known technique (defaulting to base settings upon power-up or reset) to improve similar devices (HDMI-compliant source or sink devices) in the same way.

2. Claims 1, 8, and 14

173. Claims 1, 4-5, 8, 11, and 14-16 are obvious over Iwamoto (Ground 1), Iwamoto in view of Hsieh (Ground 2), Iwamoto in view of Knight (Ground 3), and Hsieh in view of Iwamoto (Ground 4). *Supra* Sections X.A-X.D. To the extent that Patent Owner incorrectly argues that these combinations do not disclose that the device operates in default mode in response to a power-on-reset or powering up of

the device, as recited in limitations 1[a], 8[b.1], and 14[c], that feature is obvious over the above combinations in view of HDMI 1.3a.

a. “initializing a first audio/video (AV) device to operate in a default AV sink operation mode in response to a power-on-reset or powering up of the first AV device;” 1[a]

174. Iwamoto in view of HDMI 1.3a and Hsieh in view of Iwamoto and HDMI 1.3a disclose this limitation.

175. Iwamoto teaches that, when VL1 and VL2 are low, the dual-purpose device operates in a default standby mode. EX1006 at [0043]-[0044], [0072]-[0073], Figs. 2-3. Iwamoto also teaches that the device initializes in standby mode “when power is turned on and the operation of the source/sink dual-purpose device 100 is started.” *Id.* at Fig. 3, [0062].

176. Hsieh teaches that “the first HSDI transceiver is pre-set to be either the source device or the sink device prior [to] receiving or generating a first control switching command.” EX1008 at [0006], [0016]; *see also* [0020] (“***Initially***, each device is set to be the default working function, Source or sink function.”) (emphasis added).

177. To the extent that Patent Owner argues that neither Iwamoto nor Hsieh teaches initializing the device in its default mode when the device is powered on or upon a power-on reset, that feature is disclosed by HDMI 1.3a. The HDMI 1.3a specification, with which a POSITA would have been familiar and which was the

current version of the HDMI standard at the time of filing of Iwamoto and Hsieh, teaches that HDMI devices default to certain settings (a default mode) upon “power-up, reset, or detection of a new [] device.” EX1009 at 152-53. Thus, to the extent that Patent Owner incorrectly argues that Iwamoto’s standby mode or Hsieh’s default working function is not initialized upon powering up or power-on resetting of the device, it would have been obvious to a POSITA to modify the devices of Iwamoto or Hsieh in light of HDMI 1.3a such that they revert to default settings upon being powered on or reset.

b. “control logic including circuitry to configure the communication logic to initialize the AV device to operate in the default AV sink operation mode in response to a power-on-reset or powering up of the AV device,” 8[b.1]

178. For the same reasons explained above in this ground with respect to limitation 1[a], Iwamoto in view of HDMI 1.3a and Hsieh in view of HDMI 1.3a teach limitation 8[b.1]. *Supra* Section X.E.2.a; *see* EX1006 at [0043]-[0044], [0062], [0072]-[0073], Figs. 2-3; EX1008 at [0006], [0016], [0020]; EX1009 at 152-53.

c. “control logic including circuitry to configure the communication logic to initialize the AV device to operate in the default AV sink operation mode in response to a power-on-reset or powering up of the AV device....” 14[c]

179. For the same reasons explained above in this ground with respect to limitation 1[a], Iwamoto in view of HDMI 1.3a and Hsieh in view of HDMI 1.3a teach the above feature in limitation 14[c]. *Supra* Section X.E.2.a; *see* EX1006 at

[0043]-[0044], [0062], [0072]-[0073], Figs. 2-3; EX1008 at [0006], [0016], [0020];
EX1009 at 152-53.

I, Eric Welch, declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, under Section 1001 of Title 18 of the United States Code.

Dated:

A handwritten signature in black ink, appearing to read "Eric Welch", written over a horizontal line.

Eric Welch