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Paper 31
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOSHIBA CORPORATION,
Petitioner,

v.

OPTICAL DEVICES, LLC,
Patent Owner.

Case IPR2014-01446
Patent 7,196,979 B2

Before ERICA A. FRANKLIN, GLENN J. PERRY, and JAMES B. ARPIN, *Administrative Patent Judges*.

PERRY, *Administrative Patent Judge*.

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

I. INTRODUCTION

In this *inter partes* review, instituted pursuant to 35 U.S.C. § 314, Petitioner, Toshiba Corporation ("Toshiba"), challenges the patentability of claims 1, 2, 6, 7, 11, 13, 14, and 16 ("the challenged claims") of U.S. Patent No. 7,196,979 B2 to Kadlec *et al*. (Ex. 1001; "the '979 patent"), owned by Patent Owner, Optical Devices, LLC ("Optical Devices"). This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73, addresses issues and arguments raised during trial. For reasons discussed below, we determine that Toshiba has not met its burden to prove, by a preponderance of the evidence, that the challenged claims are unpatentable under 35 U.S.C. § 103(a) based on either the combined teachings of Baird and Yoshimoto or the combined teachings of Baird, Yoshimoto, and ST Datasheet.

A. Procedural History

On September 3, 2014, Toshiba filed a Petition (Paper 1, "Pet.") to institute an *inter partes* review of claims 1–18 of the '979 patent. Optical Devices filed a Preliminary Response. Paper 6. In a March 10, 2015 Decision on Institution of *inter partes* review (Paper 7 ("Dec. Inst.")), we instituted trial as to claims 1, 2, 6, 7, 11, 13, 14, and 16 on grounds of obviousness based on Baird and Yoshimoto and on Baird, Yoshimoto, and ST Datasheet.

After institution, Optical Devices filed a Patent Owner Response to the Petition (Paper 16, "PO Resp."), and Toshiba replied (Paper 18, "Pet. Reply"). Optical Devices moved to exclude Exhibits 1005, 1012, 1015, and 1016. Paper 24 ("Mot."). Toshiba opposed Patent Owner's Motion to

Exclude (Paper 27, "Opp."), and Optical Devices replied (Paper 28, "PO Opp. Reply"). We heard oral argument on January 13, 2016. Paper 30 ("Tr.").

B. Related Proceedings

Toshiba indicates that the following judicial and administrative matters could affect or be affected by a decision in this proceeding: *Optical Devices, LLC v. Toshiba Corp.*, Case No. 1:13-cv-01530 (D. Del. 2013); and *In the Matter of Certain Optical Disc Drives, Components Thereof, and Products Containing the Same*, Investigation No. 337-TA-897. Pet. 1−2.

Optical Devices indicates that the '979 patent claims priority to U.S. Provisional Application No. 60/264,351, as do U.S. Patent Nos. 7,839,729 B2 and 8,416,651 B2, which are involved in *inter partes* reviews IPR2014-01445 (pending) and IPR2014-01447 (pending), respectively. Paper 5, 1.

Optical Devices identifies additional litigation that may affect or be affected by this *inter partes* review, including *Optical Devices, LLC v. Panasonic Corp.*, Case No. 1:13-cv-00726 (D. Del. 2013); *Optical Devices, LLC v. Lenovo Group, Ltd.*, Case No. 1:13-cv-01526 (D. Del. 2013); *Optical Devices, LLC v. Nintendo Co.*, Case No. 1:13-cv-01528 (D. Del. 2013); *Optical Devices, LLC v. Samsung Electronics Co.*, Case No. 1:13-cv-01529 (D. Del. 2013); and *Optical Devices, LLC v. LG Electronics, Inc.*, Case No. 1:13-cv-01033 (D. Del. 2013). Paper 5, 1–2.

Further, we instituted *inter partes* reviews for claims of the following patents covering related subject matter: U.S. Patent Nos. 7,839,729 B2 (IPR2014-01445, Paper 7) and 8,416,651 B2 (IPR2014-01447, Paper 9).

II. THE ’979 PATENT (EX. 1001)

A. Described Invention

The ’979 patent describes calibration storage for digital focus and tracking servo systems of an optical disk drive (“ODD”). Calibrated parameters are maintained for controlling positions of components of a digital focus and tracking servo system of an ODD. Ex. 1001, Title, Abstract. The focus and tracking systems must be calibrated so as to correctly read from and write to the disk along its data track. Ex. 1001, 3:31–36. Once calibrated, operating parameters are stored and utilized by the optical disk drive until another calibration is carried out. *Id.*

B. Illustrative Claims

Independent claims 1 and 13 are illustrative and are reproduced below:

> 1. A method of maintaining operating parameters for an optical disk drive, comprising:
> *providing a digital signal processor configured to receive digitized optical sensor signals from an optical pickup unit and form a focusing error signal (FES) and a tracking error signal (TES) from the digitized optical sensor signals,*
> *the digital signal processor configured with servo algorithms that process TES and FES to adjust focus and tracking in the optical disk drive;*
> calibrating operating parameters of the servo algorithms to form calibrated parameters;
> storing the calibrated parameters; and
> operating the servo algorithms with the calibrated parameters.
>
> 13. An optical disk drive, comprising:
> an optical pick-up unit;

> an analog-to-digital converter coupled to digitize signals from detectors in the optical pick-up unit to provide digital signals;
> *at least one processor configured to form a focusing error signal (FES) and a tracking error signal (TES) from the digital signals,*
> *the at least one processor being configured with servo algorithms that process TES and FES to adjust focus and tracking in the optical disk drive;*
> wherein the at least one processor executes an algorithm that calibrates operating parameters for the servo algorithms to form calibrated parameters; and
> stores the calibrated parameters.

Ex. 1001, 77:19–78:51 (emphases added identifying disputed limitations).

III. CLAIM CONSTRUCTION

In an *inter partes* review, the Board interprets claim terms in an unexpired patent according to the broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278–79 (Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs., LLC v. Lee*, 84 USLW 3218 (U.S. Jan. 15, 2016) (No. 15-446). Under that standard, and absent any special definitions, we give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc*., 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). "In such cases, the inventor's lexicography governs." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc). In the absence of such definitions, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

Only terms, which are in controversy, need to be construed, and only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). For this reason, we provide express constructions for certain terms as follows.

A. "digital signal processor"

In the Institution Decision, we construed "digital signal processor" ("DSP") as "an integrated circuit structured and arranged for processing digital signals in accordance with programmed commands." Dec. Inst. 7.

In its Patent Owner Response, Optical Devices asserts that our initial construction is "overly broad" because it "encompasses virtually any general purpose microprocessor or microcontroller unit." PO Resp. 7. According to Optical Devices, "[o]ne of ordinary skill in the art would understand that a digital signal processor or DSP is a *specialized* microprocessor—one that is structured and arranged for high speed processing of digital signals—particularly real-time digital data streams." *Id.* at 8. In particular, Optical Devices asserts that the Specification "frequently relies on the difference between a general purpose microprocessor and a DSP in describing embodiments of the invention." *Id*. (citing Ex. 1001, 20:66–21:8)

(describing, for example, that "[i]n some embodiments, DSP 416 operates under instructions from microprocessor 432") (emphasis omitted).

In further support of its proposed claim construction, Optical Devices provides two dictionary definitions for a DSP, with one defining the term as "[a]n integrated circuit designed for high speed data manipulation and used in audio communications, image manipulation, and other data acquisition and data control applications" (Ex. 2002, 145) and the other defining the term as "[a] high-speed coprocessor designed to do real-time manipulation of signals" (Ex. 2003, 198). PO Resp. 10. In further support of its proposed construction, Optical Devices relies upon the Declaration of Raymond de Callafon, Ph.D. (Ex. 2008, "de Callafon Declaration" or "de Callafon Decl."). Optical Devices also relies upon the deposition testimony of Toshiba's declarant, Dr. Zech that a DSP is a *specialized* microprocessor architected and designed to perform *high speed processing* of digital signals, particularly real-time data processing. PO Resp. 9.

In the Petitioner's Reply, Toshiba asserts that Optical Devices' proposed construction "finds no support in the specification" and attempts improperly to import two amorphous limitations into that construction – "specialized" and "high speed." Pet. Reply 3–6. In particular, Toshiba asserts that "[n]owhere in the '979 patent specification or claims is a DSP described as a 'high speed' processor." *Id*. at 6.

As in our Institution Decision, here again we agree with Optical Devices that the Specification of the '979 patent recognizes that a DSP is different from a general purpose microprocessor. For example, the Specification states:

> FIG. 4 shows an embodiment of control chip 350 of control system 300. The embodiment of control chip 350 shown in FIG. 4 includes a microprocessor 432 and a digital signal processor (DSP) 416. Since DSP 416 operates much faster, but has lower overall capabilities (e.g., code and data storage space), than microprocessor 432, in some embodiments real time digital servo system algorithms can be executed on DSP 416 while other control functions and calibration algorithms can be executed on microprocessor 432. A control structure for embodiments of control chip 350, and interactions between DSP 416 and microprocessor 432, are further discussed in the System Architecture disclosures.

Ex. 1001, 15:40–52. From this disclosure, we recognize that the Specification suggests that a DSP operates faster than a microprocessor and, in some embodiments, real time digital servo algorithms can be executed on a DSP. The Specification, however, does not expressly define the term.

We note the competing views of Dr. de Callafon (Ex. 2008), on behalf of Optical Devices, and of Dr. Zech (Ex. 1006), on behalf of Toshiba. In particular, we recognize Dr. de Callfon's declaration testimony regarding Optical Devices' proposed construction of a DSP as substantially identical to the discussion in the Petition. *See* Ex. 2008 ¶ 19. We do not rely heavily on Dr. Zech's construction of "DSP" inasmuch as he testified that he had "no expertise" as to design elements distinguishing a DSP from a general processor. *See, e.g.*, Ex. 2001, 35:12–13, 44:12–14.

As we seek to give the term "DSP" its ordinary and customary meaning, as would have been understood by one of ordinary skill in the art at the time of the invention, we take into account the Microsoft and IBM dictionary definitions submitted by Optical Devices. We note that each of

those dictionaries define a DSP as designed for "high speed" manipulation of data/digital signals. Ex. 2002; Ex. 2003. Optical Devices, however, has not directed our attention to evidence establishing what "high speed" encompasses.

We note that one of the submitted dictionary definitions characterizes such digital signal manipulation as "real-time." Ex. 2003. However, the Specification's disclosure describes that some embodiments can execute real time digital servo algorithms on a DSP. We determine that Optical Devices has not established persuasively that the broadest reasonable interpretation of a DSP requires "high speed" processing achieving this "real time" feature. Indeed, Patent Owner's "basic" construction for a DSP does not include a "real time" requirement for "real time" processing. *See* PO Resp. 10 (providing a minimal definition for a DSP).

We are persuaded that the broadest reasonable interpretation of the term "digital signal processor," consistent with the Specification, is "an integrated circuit structured and arranged for manipulation of digital signals in accordance with programmed commands, and in a manner that operates faster than a microprocessor." We do not adopt Optical Devices' proposal to further characterize further an integrated circuit as "specialized." We find that proposed modification is superfluous in that our construction describes that the integrated circuit is structured and arranged to achieve a specific function, i.e., manipulation of digital signals and operating faster than a microprocessor.

B. "digital signals"

We construed "digital signals" in the Institution Decision as "signals using two or more states to represent signal values." Dec. Inst. 8. The

parties do not challenge this construction, and we do we find any reason to depart from it.

C. "focusing error signal"

We construed "focusing error signal" in the Institution Decision as "a digital signal representing an out-of-focus condition." *Id.* at 8−9. The parties do not challenge this construction, and we do we find any reason to depart from it.

D. "tracking error signal"

We construed "focusing error signal" in the Institution Decision as "a digital signal representing an off-track condition." *Id.* at 9−10. The parties do not challenge this construction, and we do we find any reason to depart from it.

E. Additional Terms

Optical Devices proposes construction of "a digital signal processor configured to … form a focusing error signal (FES) and a tracking error signal (TES) from the digitized optical sensor signals" and construction of "at least one processor configured to form a focusing error signal (FES) and a tracking error signal (TES) from the digital signals." PO Resp. 12.

For purposes of this decision it is not necessary to construe these phrases expressly. It is sufficient to rely on the terms already construed. Based on our analysis, we determine that no express claim construction is necessary for any remaining claim terms.

IV. PRIOR ART CHALLENGES

Toshiba relies upon the following references in support of its challenges.

References	Date	Exhibits
Patent No. US 6,204,787 B1 to Baird ("Baird")	Mar. 30, 2001 (filed Mar. 31, 1999)	Ex. 1003
Patent No. US 5,251,194 to Yoshimoto et al. ("Yoshimoto")	Oct. 5, 1993 (filed Apr. 12, 1990	Ex. 1004
Product Preview for ST TDA7522, "Digital Servo and Decoder" (the "ST Datasheet")	(not established)	Ex. 1005

Toshiba also relies upon the Declaration of Richard Zech, Ph.D. (Ex. 1006, "Zech Declaration" or "Zech Decl.").

A. Level of Ordinary Skill in the Art

The level of skill in the art is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1324 (Fed. Cir. 1999) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966) and *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991)).

Toshiba asserts that one of ordinary skill in the art at the time of the filing of the '979 patent as having:

> (1) a Bachelor's of Science Degree in Electrical Engineering, Mechanical Engineering, Physics *or* a related field and at least two years of additional experience in control system technology, optical disk servo technology, magnetic disk servo technology, or related technologies, either in industry or research[,] *or* (2) at least a Master's of Science Degree in Electrical Engineering, Mechanical Engineering, Physics *or* a related field with

> coursework in control system technology, optical disk servo technology, magnetic disk servo technology, or related technologies.

Pet. 33 (citing Ex. 1006 ¶ 67) (emphases added).

Optical Devices asserts that one of ordinary skill in the art would have "a Bachelor of Science in Mechanical or Electrical Engineering *and* at least two years of experience in control systems technology." PO Resp. 6 (citing Ex. 2008 ¶¶ 9–11) (emphasis added).

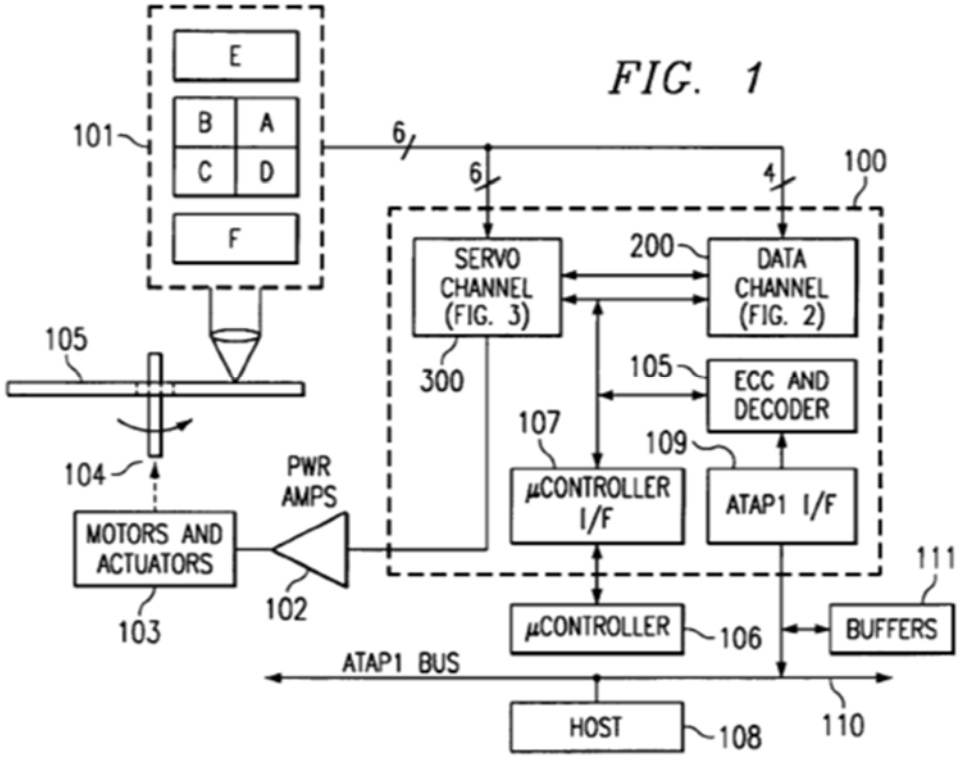
Based on our consideration of the record, we find that the evidence as a whole supports Toshiba's description of the level of ordinary skill in the art. Accordingly, we adopt Toshiba's statement of the ordinary skill in the art.

B. Challenges Based on Baird and Yoshimoto

Toshiba provides a detailed reading of claims 1–18 on Baird and Yoshimoto. Pet. 36–55, with citations to the Zech Declaration.

1. Baird (Ex. 1003)

Baird is directed to circuits and methods for gain ranging in an analog modulator and systems using the same. Ex. 1003, 1:33–35. Baird's Figure 1 is reproduced below.



Baird's Figure 1 is a conceptual and block diagram of an exemplary personal computer based optical disk playback system. Ex. 1003, 2:59–60. Optical pick-up unit 101 includes photodetectors A–F which provide six respective signals to a "drive manager integrated circuit" ("IC") 100. IC 100 includes "servo channel" 300, which provides servo control for motors and actuators associated with mechanical manipulation of the optical playback system. Integrated circuit 100 also includes "data channel" 200 for processing data signals read from disk 105. *Id.* at 3:24–61. The "servo channel" is shown in more detail in Baird's Figure 3, reproduced below.

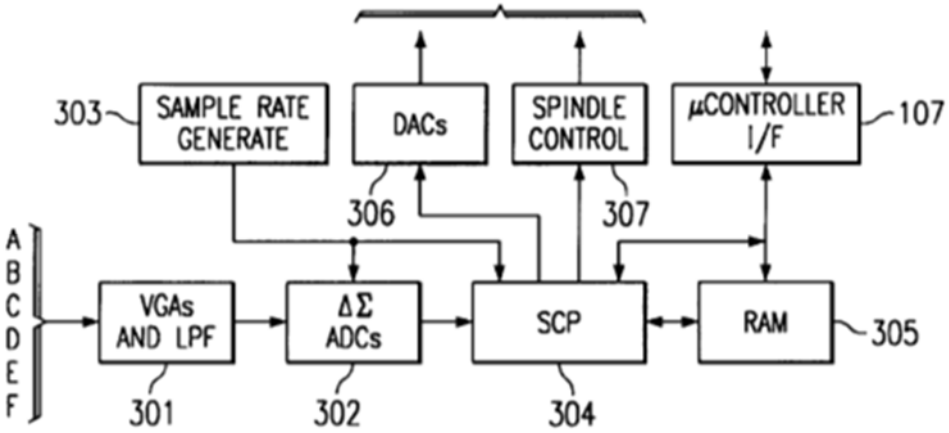


FIG. 3

Baird's Figure 3 is a diagram showing further detail of the servo control path shown in Baird Figure 1. Ex. 1003, 2:64–65. Servo data is received from six photodiodes 101 (i.e., photodetectors A–F) and converted into digital signals by analog to digital converters ("ADCs") 302. *Id.* at 5:63–65. Servo data processing is performed by on-board servo control processor ("SCP") 304. *Id.* at 6:12–15. SCP 304 operates according to an instruction set provided by microcontroller 106 (Figure 1). *Id.* at 6:12–15.

2. Yoshimoto (Ex. 1004)

Yoshimoto describes techniques for controlling beam position (tracking) and focus in optical disk drives. Ex. 1004, Title. Toshiba relies upon Yoshimoto as describing calibration including determining tracking offsets, focus offset values, servo deviation threshold values, and sensor gain values. Pet. 36 (citing Ex. 1004, Abstract). According to Yoshimoto's Abstract:

> The disk surface is divided into a plurality of regions, and calibration values for adjusting the servo circuits are determined

> in each region. The calibration values are stored in a memory and are used to adjust the servo circuits during tracking on a predetermined track. The calibration values include tracking offset values, focus offset values, servo deviation threshold values and sensor gain values. A number of techniques are disclosed for automatically determining the calibration values.

Ex. 1004, Abstract.

3. Baird's Servo Control Processor as a DSP

According to Toshiba, Baird discloses an "on-board control processor (SCP) 304 which receives the claimed digital signals from the analog-to-digital converters." Pet. 39 (citing Ex. 1003, 6:12–15). Specifically, Toshiba asserts that the SCP receives six separate digitized photodetector signals, each of which have been amplified using six separate VGAs and amplified using separate analog to digital converters ("ADCs") 302. *Id*. (citing Ex. 1003, 5:63–6:11). Additionally, Toshiba asserts that Baird discloses the SCP as part of an "integrated servo system that operates four control loops: focus, tracking[,] sled, and spindle, using an intermal servo control processor requiring little external microcontroller intervention." *Id*. at 39 (quoting Ex. 1003, 5:59–62 (citing Ex. 1006 ¶ 77). Toshiba asserts that Baird also discloses that the servo data processing "is performed by on-board servo control processor (SCP) 304, which receives its instruction set from the user selected local microcontroller 106 through interface 107 and RAM 305." *Id*. (quoting Ex. 1003, 6:12–15). Based on those disclosures, Toshiba asserts that one of ordinary skill in the art would have understood that Baird's SCP is a (1) DSP used for performing servo functions and (2) a non-dedicated programmable device that is optimized for processing received digital signals using programmed commands. *Id.* at 39–40.

In further support for its contention that one skilled in the art would have understood Baird's servo processor is a DSP, Toshiba refers to the '729 patent file history wherein Applicant stated the following:

> Applicant appreciates the suggested replacement title provided by the examiner. However, it is respectfully noted that prior art optical disk drive servos also use digital signal processors — that use is old. What is not old, however, is ***the provision of a servo processor (e.g., a DSP)*** that receives versions of the photodetector signals such that the servo processor is the component that calculates the resulting servo algorithm error signals (FES for focus and TES for tracking).

Pet. 40 (quoting Ex. 1008, 139; Ex. 1002, 139 in IPR2014-01445). Toshiba draws support also from a second statement made by that Applicant:

> Thus, just as the Examiner would hear a version of a caller's voice on the telephone (as opposed to the actual sound of the caller''s voice that would be heard by the Examiner in a face-to-face conversation) so does ***the claimed servo processor*** receive processed versions of the photodetector signals.

Id. at 41 (quoting Ex. 1008, 140–141 in IPR2014-01445). According to Toshiba, Applicant's use of the terms "digital signal processor" and "servo processor" interchangeably establishes persuasively that Baird's SCP also must be considered a DSP. *Id*.

Optical Devices asserts that Baird's SCP does not constitute "a digital signal processor (DSP)." PO Resp. 16. According to Optical Devices, a "DSP typically comes with additional flash memory and/or RAM," and is distinguished from a general purpose microprocessor and/or microcontroller "due to the specialized architecture for the computational needs in digital signal processing." *Id*. at 18 (citing Ex. 2008 ¶ 29). Optical Devices asserts

that "[t]he specialization ensures that calculations can be done as fast as possible with as little latency as possible." *Id*. at 19 (citing Ex. 2008 ¶ 31).

Optical Devices asserts that Baird's Figure 3 shows that "the RAM (memory) is separate from the SCP and data flow would go through the SCP to the RAM." *Id*. at 23−24. According to Optical Devices, because the memory to process data is not part of the processor architecture, "the SCP is inconsistent with a typical DSP architecture." *Id*. In other words, Optical Devices asserts that Baird's SCP "does not consitute a DSP, since hardware assisted computations would have to have direct memory access to qualify as a DSP programmed command." *Id*. (citing 2008 ¶ 39).

Based on our review of Baird, we disagree with Optical Devices' characterization of the SCP depicted in Figure 3 as not having direct access to RAM. Although the RAM is separated from the SCP, Figure 3 depicts a two-way arrow positioned directly between the two elements. Optical Devices has not explained persuasively why a skilled artisan would not have understood that the two-way arrow as indicating direct access to RAM by the SCP. *See* Tr. 46:16–50:8. Moreover, we note that Dr. de Callafon characterizes a DSP as "typically" having RAM, and because Baird's RAM is separate from the SCP, it is inconsistent with "typical" DSP architecture. Ex. 2008 ¶¶ 29, 38. Thus, neither Dr. de Callafon's declaration nor our construction of DSP prohibits RAM from being separate from the DSP.

Further, based upon our review of the record, Optical Devices has not addressed either of Applicant's statements referenced by Toshiba wherein the terms "digital signal processor" and "servo processor" were used interchangeably, suggesting that Baird's SCP may be considered a DSP.

Based on our review of the record as a whole, and in view of our claim construction for the claim term "digital signal processor," we find that the preponderance of the evidence establishes that one of ordinary skill in the art would have understood Baird's SCP to be a DSP used to perform servo functions.

4. Whether Baird Discloses a DSP Determining an FES and TES

Optical Devices argues that Baird fails to disclose a DSP that determines an FES and TES. PO Resp. 24–33.

Toshiba asserts that "[i]t is *inherent* that the servo control processor of Baird determines focus error signal and tracking error signal." Pet. 41–42 (emphasis added). Toshiba reasons that because Baird discloses that the SCP performs focus and tracking control loops, "it is necessarily the case that a focus error and tracking error signal are generated" in order to perform that function. *Id.*; Ex. 1006 ¶ 81; *see* Tr. 20:21–23:5. According to Toshiba and Dr. Zech, one of ordinary skill in the art would have understood that those error signal calculations must occur within the SCP because Baird does not disclose any other circuitry or block in its design that could perform that function. Pet. 41–42; Ex. 1006 ¶ 81. Additionally, Toshiba asserts that Baird's SCP necessarily determines FES and TES because Baird's disclosure that the SCP receives digitized photodetector signals and generates servo control signals requires a determination of the error signals. Pet. 41–42 (citing Ex. 1006 ¶ 81).

Optical Devices contends that it is not inherent that the servo control processor of Baird is further configured to determine a focus error signal (FES) and a tracking error signal (TES) from the digital signals it receives,

as required by both independent claims. PO Resp. 24–25. Optical Devices asserts that "Baird is silent with respect to the operations and locations of the four control loops, as well as any generation of focus or tracking error signals." *Id*. at 25.

Regarding Baird's disclosure that the SCP processes the servo loops to create control signals, Optical Devices asserts that "Baird fails to provide any description of how its control loops operate" or even if the loops are "open" or "closed." *Id*. at 28. According to Optical Devices, "a person of ordinary skill in the art would also understand that there are different types of servo control loops, including, but not limited to, 'open' and 'closed' servo control loops." *Id*. at 27; Ex. 2008 ¶ 47. Optical Devices asserts that one of ordinary skill in the art also would have understoods that open loops operate without any feedback and, thus, do not require the determination of error signals. PO Resp. 28; Ex. 2008 ¶ 47.

For example, Optical Devices asserts that "[o]ne example of 'open loop' control system is one which reacts before an error actually occurs, which is called feedforward control or predictive control." *Id*. (citing Ex. 2008 ¶ 49). Optical Devices and Dr. de Callafon explain that "[f]eedforward control is not error-based, but instead is based on knowledge about the process in the form of a mathematical model of the process or knowledge about or measurements of the process disturbances." *Id*. at 28–29; Ex. 2008 ¶ 49. According to Optical Devices and Dr. de Callafon, such knowledge is useful for a servo system wherein the process and process disturbances have a repetitive nature, making it easier to predict and react before any error occurs. PO Resp. 28–29; Ex. 2008 ¶ 49. Optical Devices and Dr. deCallafon explain further that "[r]epetitive movements and repetitive

control signals are found in an optical disk drive where the disk is constantly rotating creating repetitive and predictable error signals." PO Resp. 29; Ex. 2008 ¶ 50. Optical Devices asserts that it was known in the art that repetitive control signals needed for such a repetitive system could be designed via iterative learning or a repetitive control algorithm and that one of skill in the art would have understood that the repetitive control signals are applied in an open loop fashion to control the actuator in the optical disk drive. PO Resp. 29. Therefore, according to Optical Devices and Dr. de Callafon, Baird's disclosure of a servo system "does not imply unequivocally that the servo system is either 'open' or 'closed'." *Id*.

Further, Optical Devices asserts that one of skill in the art would have understood that, although closed loops operate based upon feedback, "that feedback need not result in the determination of error signals." *Id*. at 30; Ex. 2008 ¶ 51. In such cases, Optical Devices asserts that servo control can be done on the basis of feedback of the measurement of the actual reference signal as opposed to a measurement of the difference between the reference and the output. PO Resp. 30 (citing Ex. 2008 ¶ 51). Thus, Optical Devices contends that Baird's teaching that the servo system uses the SCP to operate focus and tracking control loops does not inherently disclose that the SCP determines any error signals, much less FES and TES. *Id*. at 33; *see* Tr. 64:16–65:14.

In its Reply, Toshiba asserts that Optical Devices has not provided any evidence that alternative control methods could be used for an optical disk system, such as the system disclosed in Baird. Pet. Reply 13. According to Toshiba, Optical Devices's declarant, Dr. de Callafon, testified

that photodetector signals are not used in open loop systems. *Id*. at 12 (citing Ex. 1017, 110:24–111:6). Because Baird discloses receiving servo data from photodetector signals, Toshiba asserts that "by Patent Owner's own admission, Baird *teaches away* from using an open loop system for servo control." *Id*. (emphasis added). Further, Toshiba asserts that optical disks contain imperfections, such that an open loop control system would lack the necessary feedback to adjust for those imperfections. *Id*. at 12–13 (citing Ex. 1006 ¶¶ 25, 32–35). We take Toshiba's argument to be that Optical Devices makes a weak argument in suggesting that Baird may use open loop control.

Having considered the arguments and evidence, we are not persuaded that Toshiba has established by a preponderance of the evidence that Baird inherently discloses a DSP configured to determine a FES and a TES from digital signals received by the SCP. In particular, Toshiba's primary contention with respect to inherency is that one of ordinary skill in the art would have understood that Baird must determine a FES and TES in order for the SCP to operate focus and tracking control loops. Pet. Reply 14 (citing Ex. 1006 ¶ 81). However, neither Toshiba nor Toshiba's declarant, Dr. Zech, provides any explanation why that is true. When asked for an explanation during his deposition, Dr. Zech responded in a manner that relied upon a probability that Baird's SCP determines FES and TES. For example, the following is an excerpt from Dr. Zech's deposition:

> Q Can you explain to me why it is your opinion that it is inherent that a servo control processor in Baird determines a focus error signal and a tracking error signal?
>
> A Well, because the way he designed it, it does. And I can't imagine why somebody, an engineer

> at Cirrus Logic, would swim against the current and come up with something entirely new. The chip surely would not sell. I know that from pretty broad experience in sales and marketing.
>
> Once you tell me optical disk drive -- *I've explained to you the statistics of it -- 99 percent plus are probably using continuous composite servoing.* When you use continuous composite servoing, you need to have a tracking error and a focus error signal. *So it's not much of a leap for me to conclude that that's what's going on here.*

Ex. 2001, 151, 3–20 (emphases added). Dr. Zech's deposition testimony describes what functions and systems optical disk drives "are probably using" and that "it's not much of a leap" for him to conclude what is occuring in Baird with respect to whether error signals are determined *Id*.; *See MEHL/Biophile Int'l Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999) (inherency is not to be established by probabilities or possibilities). Moreover, both in his declaration and at the deposition, Dr. Zech bases his opinion regarding that issue on assumptions unsupported by evidence. *See* Office Patent Trial Practice Guide 77 Fed. Reg. 48, 756, 48,763 (Aug. 14, 2012) ("Affidavits expressing an opinion of an expert must disclose the underlying facts or data upon which the opinion is based. . . . Opinions expressed without disclosing the underlying facts or data may be given little to no weight.") (citations omitted). Thus, we do not afford Dr. Zech's unsupported opinions persuasive weight.

Further, based upon our review of the record, we find that Optical Devices has presented a credible challenge to Toshiba's assertion that Baird's SCP necessarily determines FES and TES. *See* PO Resp. 24–32

(discussed *supra*). In particular, Optical Devices and Dr. de Callafon have provided reasonable explanations and examples demonstrating that Baird's SCP may operate using (a) an open loop that is not dependent upon the determination of FES or TES, or (b) a closed loop that is based upon feedback not requiring the determination of those error signals. *Id*. We disagree with Toshiba's assertion that Optical Devices has not provided examples or explained how or why open loop systems could be used in a servo control system in an optical disk drive system. *See* Pet. Reply 13. Optical Devices and Dr. de Callafon explained that in an optical disk drive, where the disk is constantly rotating, repetitive control signals are found. PO Resp. 28–29: Ex. 2008 ¶ 50. Optical Devices and Dr. de Callafon also explained that it was known in the art that a repetitive system could be designed via iterative learning or a repetitive control algorithm to produce repetitive control signals needed for such a repetitive system. PO Resp. 29; Ex. 2008 ¶ 50. Further Optical Devices and Dr. de Callafon explained that the repetitive control signals are applied in an open loop fashion to control the actuator in the optical disk drive. *Id*.

We also do not agree with Toshiba's assertion that Dr. de Callafon's testimony amounts to an admission by Optical Devices that Baird "teaches away"[1] from using an open loop system for servo control. Pet. Reply 12. In support of that contention, Toshiba relies on Dr. de Callafon's deposition

[1] "Teaching away" arguments, moreover, are not appropriate in the context of anticipation. *Celeritas Techs. Ltd. v. Rockwell Int'l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998) (The prior art was held to anticipate the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed.").

testimony relating to some "very simple open loop solutions for optical drives that didn't use any error measurement." Ex. 1017, 110:24–111:6. Toshiba asked whether "those systems utilize photodetector signals for the purposes of servo?" *Id*. at 110:24–111:1. Dr. de Callafon answered, "If they are purely open loop, *probably not*." *Id.* at 111:3–6 (emphasis added). However, prior to that conditional statement, Dr. de Callafon explained that the photodetector signals received by the SCP in Baird would be useful in an open loop servo because those signals can provide information about the repetitive motion of the disk. *Id.* at 75:17–76:24. Dr. de Callafon explained further that the repetitive motion need not be a FES or TES, but, instead, a "reference signal," that is not based upon any error signal. *Id*. at 76:14–77:2.

In view of the evidence, arguments, and Baird's silence with respect to how focus and tracking control are accomplished by the SCP, and, in particular, whether such control relies upon determining any error signals, or, even if the servo operates in an open or closed loop, we are not persuaded that the preponderance of the evidence establishes that Baird's SCP determines, calculates, or otherwise provides FES and TES, as required by each of the challenged claims.

Optical Devices notes that Toshiba does not contend that Yoshimoto discloses the claimed DSP and, therefore, does not cure the deficiencies of Baird. PO Resp. 34–37.

We agree that Toshiba does not rely on Yoshimoto to supply missing limitations from Baird. Pet. 38−55. Toshiba relies upon Yoshimoto only with respect to its teachings regarding details of calibration. *Id.*

Toshiba argues that, to the extent we find that Baird does not inherently disclose determining an FES and TES, the ST Datasheet explicitly discloses determining an FES and a TES. PO Reply, 15. However, as discussed *infra*, we conclude that ST Datasheet has not been established as a reference against the '979 patent in this proceeding.

5. Conclusion

We, therefore, conclude that Petitioner has not established by a preponderance of the evidence that Baird and Yoshimoto render claims 1–18 of the '979 patent unpatentable.

C. Obviousness based on Baird, Yoshimoto, and ST Datasheet (Ex. 1005)

Toshiba contends that claims 1–18 of the '979 patent are rendered obvious by the combination of Baird, Yoshimoto, and the ST Datasheet. Pet. 56–60. Optical Devices disagrees. PO Resp. 34–50. In particular, our analysis focuses on Optical Devices' assertion that the ST Datasheet does not qualify as a prior art. *Id*. at 38–42.

1. ST Datasheet

The ST Datasheet describes a TDA7522 Digital Servo and Decoder having a built in microcontroller. Ex. 1005, 1. The ST Datasheet is a twenty-three page document that contains the date of "May 1998" at the bottom of the first page. *Id*. Below the date is a statement that characterized the document as containing "*preliminary* information on a new product now in development. Details are subject to change without notice." *Id*. (emphasis added). On the last page of the document is a statement that the "[i]nformation furnished is believed to be accurate and reliable." *Id*. at 23. Additionally, the last page of the document states, "Specifications mentioned

in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied." *Id*.

2. Whether ST Datasheet is a "printed publication"

For a reference to be considered a "printed publication" so as to qualify as a prior art printed publication under 35 U.S.C. § 102, the reference must be shown to have been "sufficiently accessible to the public interested in the art" prior to the earliest effective filing date. *In re Cronyn*, 890 F.2d 1158, 1160 (Fed. Cir. 1989).

Toshiba contends in the alternative that the ST Datasheet discloses a digital signal processor, which, combined with the other cited prior art, renders the challenged claims obvious. Pet. 56–60 (citing Ex. 1005, 1, 7). According to Toshiba, the ST Datasheet qualifies as a printed publication under pre-AIA 35 U.S.C. § 102(b) with respect to the '979 patent because the ST Datasheet "was published in May 1998 in the United States." *Id.* at 56. In support of its alleged publication date, Toshiba relies upon the "May 1998" date on the front page of ST Datasheet, a Technical/Product Press Announcement (Ex. 1012) dated May 18, 1998, describing the TDA7522 Digital Servo and Decoder (Pet. 56), and the declaration testimony of Dr. Zech (Ex. 1006 ¶ 123). At the institution phase, we determined that Toshiba provided sufficient evidence tending to show that the ST Datasheet was publicly available and accessible as of May 1998. Dec. Inst. 23.

In the Patent Owner Response, Optical Devices argues that the ST Datasheet "does not qualify as a prior art printed publication because there is no evidence to prove that it was made sufficiently accessible to the public" during "May 1998," or at any time prior to the critical date of the '979

patent. PO Resp. 38–39. According to Optical Devices, that date printed on the lower left portion of the datasheet "is inadequate on its face to demonstrate availability and accessibility to the public." *Id*. at 39. With respect to the press announcement[2] (Ex. 1012), Optical Devices asserts, among other things, that the announcement also "does not provide any evidence to prove that the ST Datasheet was made sufficiently accessible to the public interested in the art before the critical date." *Id*. at 40–41. Rather, Optical Devices asserts that the press announcement only suggests the availability of a purported *product*, i.e., the ST TDA 7522 chip, and not the availability or accessibility of the *document* at issue, i.e., ST Datasheet, on a particular date. *Id*. at 42.

In its Petitioner Reply, Toshiba responds to Optical Devices' argument by asserting that the disclaimer information included at the end of the datasheet "is evidence of clear *intent* for the publisher to share the document with potential customers." Pet. Reply 18 (emphasis added). Toshiba argues that it is clear from this evidence along with the details of the datasheet itself and the release of the product in May 1998, that the ST Datasheet was available for interested parties to access well before the priority date of the '979 patent. *Id*. at 18–19.

After considering the admissible evidence and arguments,[3] we find that Optical Devices has challenged persuasively Toshiba's assertion that the ST Datasheet was publicly accessible prior to the critical date. While the ST

[2] Ex. 1012 is printed from the Internet Archive's "Wayback Machine."

[3] *See infra* Section V (addressing the Motion to Exclude with respect to Exhibits 1015 and 1016).

Datasheet contains a May 1998 date and refers to itself as a "publication," (*see* Ex. 1005, 23), the reference does not provide any definitive statement or identification that it was accessible to the public interested in the art in May 1998. At most, Toshiba has established that the version of ST Datasheet provided as Exhibit 1005 was printed in May 1998. In other words, the document represents a May 1998 version of the "preliminary information" compiled for the TDA7522 product that was in development. *See* Ex. 1005, 1 ("This is preliminary information of a new product now in development."). We also note that the ST Datasheet contains a statement that "[t]his publication supersedes and replaces all information previously supplied." *Id*. at 23. However, the ST Datasheet does not state or otherwise indicate to whom the information was supplied or made available, much less when.

Upon further consideration of the press announcement, dated May 18, 1998, describing the TDA7522 chipset (Ex. 1012), we agree with Optical Devices that the press announcement describes the availability of a *product*, i.e., the ST TDA 7522 chip, (*see* Ex. 1012, 1 ("a special version of the TDA 7522 is available")), but not the availability or accessibility of the ST Datasheet at that time. The press announcement does not refer to the ST Datasheet or mention that such information regarding the product was available.

Indeed, Toshiba's declarant, Dr. Zech, acknowledges that the press announcement refers only to the availability of the TDA7522 chip in May 1998. Ex. 1006 ¶ 123. Beyond that acknowledgement, Dr. Zech offers only conjecture stating that "it stands to *reason* that the ST Datasheet also was available in May 1998, as chip companies typically disseminate a datasheet

when they introduce a new chip." *Id*. (emphasis added). Dr. Zech, however, did not provide testimony or evidence to support that *reasoning*. Nor did Dr. Zech assert that he had knowledge specifically relating to ST Micro's business practices in 1998. Thus, we do not afford persuasive weight to Dr. Zech's statements regarding the apparent availability of the ST Datasheet. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. at 48,763 ("Affidavits expressing an opinion of an expert must disclose the underlying facts or data upon which the opinion is based. . . . Opinions expressed without disclosing the underlying facts or data may be given little or no weight.") (citations omitted).

Without more, for example, a declaration from a knowledgeable representative of ST Micro regarding the normal business practice in May 1998 of making datasheets available for download on or near the date provided on the publication, we do not find that Toshiba has supported adequately its contention that ST Micro made the ST Datasheet submitted as Exhibit 1005 available for download on its public website or otherwise publicly accessible, prior to the critical date. *See, e.g., In re Enhanced Security Research, LLC*, 739 F.3d 1347, 1354–55 (Fed. Cir. 2014) (finding dated manual was publically available based, in part, upon the declaration of the Chief Executive Officer of the company that produced the product described in the manual averring that the version of the manual relied upon was accessible to public on the date inscribed on the manual).

A determination whether a particular reference qualifies as a printed publication "must be approached on a case-by-case basis." *In re Hall*, 781 F.2d 897, 899 (Fed. Cir. 1986). In this case, based on the foregoing facts and discussion, we determine that Toshiba has not established that the ST

Datasheet was publicly accessible prior to the critical date so as to render it a "printed publication" for the purposes of 35 U.S.C. § 102(b). Thus, the ST Datasheet does not qualify as prior art.

Accordingly, Toshiba has not shown by a preponderance of the evidence that the challenged claims would have been obvious over the combination of Baird, Yoshimoto, and the ST Datasheet because the ST Datasheet is not available as prior art.

V. MOTION TO EXCLUDE

Optical Devices filed a Motion to Exclude Exhibits 1005, 1012, 1015, and 1016. Mot. 24. In its motion, Optical Devices characterizes its challenge of Exhibit 1005 (the ST Datasheet) and Exhibit 1012 (the Press Announcement) as "lacking authentication, inadmissible hearsay, and/or irrelevant." *Id*. at 1. It is apparent, however, from Optical Devices' argument in support of those contentions that the issue instead relates to a sufficiency of the evidence with respect to whether Exhibits 1005 and 1012 establish that Exhibit 1005 qualifies as a "printed publication." For example, Optical Devices asserts that Exhibits 1005 and 1012 are inadmissible because "there is insufficient evidence to support finding that [those exhibits] are documents that were publicly available at the time [Toshiba] purports they were." *Id*. at 2. That issue is properly addressed in our analysis above, rather than in the context of a Motion to Exclude. Accordingly, we *deny* the Motion to Exclude with respect to Exhibits 1005 and 1012.

Regarding Exhibits 1015 and 1016, Optical Devices asserts that those exhibits should be excluded as "untimely" because Toshiba submitted them

in response to Optical Devices' objections to Exhibits 1005 and 1012 more than ten business days after being served with those objections. *Id*. at 8–10 (citing 37 C.F.R. § 42.64(b)). Additionally, Optical Devices asserts that Exhibits 1015 and 1016 should be excluded because Toshiba failed to seek authorization to file a motion to submit supplemental information pursuant to 37 C.F.R. § 42.123(b). *Id*. at 10.

Petitioner submitted Exhibits 1015 and 1016 for the first time with its Reply Brief, without authorization. Petitioner describes Exhibit 1015 as a current STMicro webpage containing a link to a downloadable datasheet for a digital UV index sensor, i.e., "UNIS25." Reply 19. Petitioner describes Exhibit 1016 as an "Internet Archive screenshot of one of STMicro's websites as of December 4, 2000" purportedly displaying a list of downloadable ST Micro datasheets describing "Audio & Radio" products, including the datasheet for "part number 'TDA7522.'" *Id*. Exhibit 1016 includes a declaration by an employee at the Internet Archive stating that the screenshots submitted as Exhibit 1016 "are true and accurate copies of printouts of the Internet Archive's records of the HTML files for URLs and the dates specified in the footer of the printout." Ex. 1016, 1.

Petitioner admits that those exhibits were neither served nor filed under 37 C.F.R. § 42.64(b) in response to Patent Owner's evidentiary objections (*see* Ex. 2009 (serving objections to Exhibits 1005 and 1012 on Mar. 24, 2015); Ex. 2010 (serving objections to Exhibits 1015 and 1016 on Sept. 21, 2015)), nor filed under 37 C.F.R. § 42.123(b) as "supplemental information." Opp. 14–15. Instead, according to Petitioner, Exhibits 1015 and 1016 "were introduced for purposes of responding to Patent Owner's arguments in its Response (Paper 16) pursuant to 37 C.F.R. § 42.23." *Id*.

Petitioner's reliance on 37 C.F.R. § 42.23 as justification for submitting evidence not initially part of the record is misplaced. Section 42.23(b) states that "[a] reply may only respond to arguments raised in the corresponding opposition or patent owner response." That section does not authorize or otherwise provide a means for supplementing the evidence of record. As explained in the Office Patent Trial Practice Guide, "a reply that . . . belatedly presents evidence will not be considered and may be returned." 77 Fed. Reg. at 48,767.

An *inter partes* review is subject to strict statutory deadlines at both the institution stage and at the final decision. 35 U.S.C. §§ 314(b), 316(a)(11). Unnecessary delay in the presentation of arguments or evidence by either party impedes the Board in fulfilling its mandate "to secure a just, speedy, and inexpensive resolution of every proceeding." 37 C.F.R. § 42.1(b); *see Redline Detection, LLC v. Star Envirotech, Inc.*, 811 F.3d 435, 445 (Fed Cir. 2015) ("The guiding principle for the PTAB in making any determination is to 'ensure efficient administration of the Office and the ability of the Office to complete IPR proceedings in a timely manner.'" (citations omitted)). The Petition represents Petitioner's case-in-chief, and Petitioner is tasked with presenting the evidence, upon which Petitioner relies in support of its challenges to Patent Owner's claims in its Petition. 35 U.S.C. § 312(a)(3); *see* 37 C.F.R. § 42.104(b)(5).

Nevertheless, our Rules expressly provide procedures for introducing supplemental evidence or supplemental information into a proceeding. *See* 37 C.F.R. §§ 42.64(b)(2) (supplemental evidence), 42.123(a)–(c) (supplemental information). Petitioner was aware of Patent Owner's

challenge to the public accessibility of the ST Datasheet by December 11, 2014, the filing date of the Preliminary Response (*see* Prelim. Resp. 19–23), and certainly by no later than March 24, 2015, the service date of Exhibit 2009 noting objections to Exhibits 1005 and 1012. *See* Ex. 2010 (serving objections to Exhibits 1015 and 1016 on Sept. 21, 2015). Although Petitioner was aware early on of the possible need for such supplemental evidence or information in this proceeding, Petitioner made no apparent effort to take advantage of available procedures. *See Avocent Huntsville Corp. v. Cyber Switching Patents, LLC*, Case IPR2015-00690, slip op. at 5–7 (PTAB Oct. 2, 2015) (Paper 28) ("Supplemental evidence, served in response to an evidentiary objection, is offered solely to support admissibility of the originally filed evidence and to defeat a motion to exclude that evidence, and not to support any argument on the merits (i.e., regarding the patentability or unpatentability of a claim)."); *Palo Alto Networks, Inc. v. Juniper Networks, Inc.*, Case IPR2013-00369, slip op. at 2–3 (PTAB Feb. 5, 2014) (Paper 37) (granting a motion to submit supplemental information regarding public accessibility of references serving as a basis for instituted grounds). Petitioner does not contend that Exhibit 1015 or 1016 was not available to Petitioner prior to the filing of Petitioner's Reply (Opp. 14–15; *see* Pet. Reply 17–20 (discussing Exhibits 1015 and 1016)), and Petitioner has not provided any other persuasive explanation for the undue delay in submitting Exhibits 1015 and 1016, other than that it believed it simply could wait until it filed its final substantive paper (Opp. 14–15).

Accordingly, we *grant* Patent Owner's Motion to Exclude with respect to Exhibits 1015 and 1016. We exclude Exhibits 1015 and 1016, and

we do not consider those exhibits or the arguments in the Reply Brief addressing those exhibits, in this proceeding.

VI. CONCLUSIONS

For reasons stated above, we conclude that

1. Toshiba has not established the ST Datasheet as being a printed publication citable against the '979 patent;

2. Toshiba has not established by a preponderance of the evidence that claims 1, 2, 6, 7, 11, 13, 14, and 16 are unpatentable based on Baird and Yoshimoto or based on Baird, Yoshimoto, and ST Data.

VII. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Toshiba has not established that claims 1, 2, 6, 7, 11, 13, 14, and 16 of the '913 patent are unpatentable;

FURTHER ORDERED that Optical Devices' Motion to Exclude is *denied* as to Exhibits 1005 and 1012;

FURTHER ORDERED that Optical Devices' Motion to Exclude is *granted* as to Exhibits 1015 and 1016; and

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

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