

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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XILINX, INC.,  
Petitioner,

v.

INTELLECTUAL VENTURES I LLC,  
Patent Owner.

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Case IPR2013-00112  
Patent 5,779,334

Before SALLY C. MEDLEY, KARL D. EASTHOM, and  
JUSTIN T. ARBES, *Administrative Patent Judges*.

ARBES, *Administrative Patent Judge*.

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

## I. BACKGROUND

Petitioner Xilinx, Inc. (“Xilinx”) filed a Petition (Paper 2) (“Pet.”) seeking *inter partes* review of claims 1–14 of U.S. Patent No. 5,779,334 (“the ’334 patent”) pursuant to 35 U.S.C. §§ 311–319. On June 27, 2013, we instituted an *inter partes* review of claims 1–6 and 11–14 on one ground of unpatentability (Paper 14) (“Dec. on Inst.”).

Subsequent to institution, Patent Owner Intellectual Ventures I LLC (“IV”) filed a Patent Owner Response (Paper 26) (“PO Resp.”), and Xilinx filed a Reply (Paper 30) (“Pet. Reply”). Along with its Patent Owner Response, IV filed a Motion to Amend (Paper 27) (“Mot. to Amend”), proposing substitute claim 15 if the Board determines claim 3 to be unpatentable, and substitute claim 16 if the Board determines claim 12 to be unpatentable. Xilinx filed an Opposition to the Motion to Amend (Paper 31) (“Pet. Opp.”), and IV filed a Reply (Paper 35) (“PO Reply”).

IV filed a Motion for Observation (Paper 41) (“Obs.”) on the cross-examination testimony of Xilinx’s declarant, A. Bruce Buckman, Ph.D., and Xilinx filed a Response (Paper 45) (“Obs. Resp.”). IV also filed a Motion to Exclude (Paper 42) (“Mot. to Exclude”) certain testimony of Dr. Buckman. Xilinx filed an Opposition to the Motion to Exclude (Paper 44) (“Exclude Opp.”), and IV filed a Reply (Paper 47) (“Exclude Reply”).

An oral hearing was held on January 28, 2014, and a transcript of the hearing is included in the record (Paper 50) (“Tr.”).

The Board has jurisdiction under 35 U.S.C. § 6(c). This final written decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

For the reasons that follow, we determine that Xilinx has shown by a preponderance of the evidence that claims 1–6 and 11–14 of the '334 patent are unpatentable, and we deny IV's Motion to Amend.

*A. The '334 Patent*

The '334 patent<sup>1</sup> relates to a “color video projector system” having “separate light sources for producing separate beams of light which are passed each first through color filters to provide separate color beams before being processed by video-controlled light shutter matrices and then combined into a single beam projectable to provide a full-color video display with superimposed color spots.” Ex. 1001, Abstract. In another embodiment, “a single white-light source is used, and the beam of white light is split by a prism system into separate color beams.” *Id.* The '334 patent describes how prior art video projector systems, such as color Liquid Crystal Display (LCD) projectors, were expensive and had difficulty providing adequate light levels. *Id.* at col. 1, ll. 15–25. Later systems based on “active matrix color LCD's (AM-LCD's)” were less expensive, but still had limited brightness and resolution. *Id.* at col. 1, ll. 26–37. The '334 patent addresses these problems by “pre-coloring” the input light and “using a triple monochrome LCD structure instead of a color AM-LCD.” *Id.* at col. 2, ll. 7–19. The resulting arrangement, according to the '334 patent, provides better light output because less light is absorbed than in a color AM-LCD, and results in better resolution due to the superposition of color

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<sup>1</sup> The '334 patent is a continuation-in-part of U.S. Patent Application No. 08/686,809, which issued as U.S. Patent No. 5,632,545 (“the '545 patent”). The '545 patent is the subject of related Case IPR2013-00029.

spots on the display. *Id.* It also is less expensive because monochrome LCDs are less expensive than color LCDs, and precise alignment of the components is less critical than with a color AM-LCD. *Id.*

Figure 1 of the '334 patent is reproduced below.

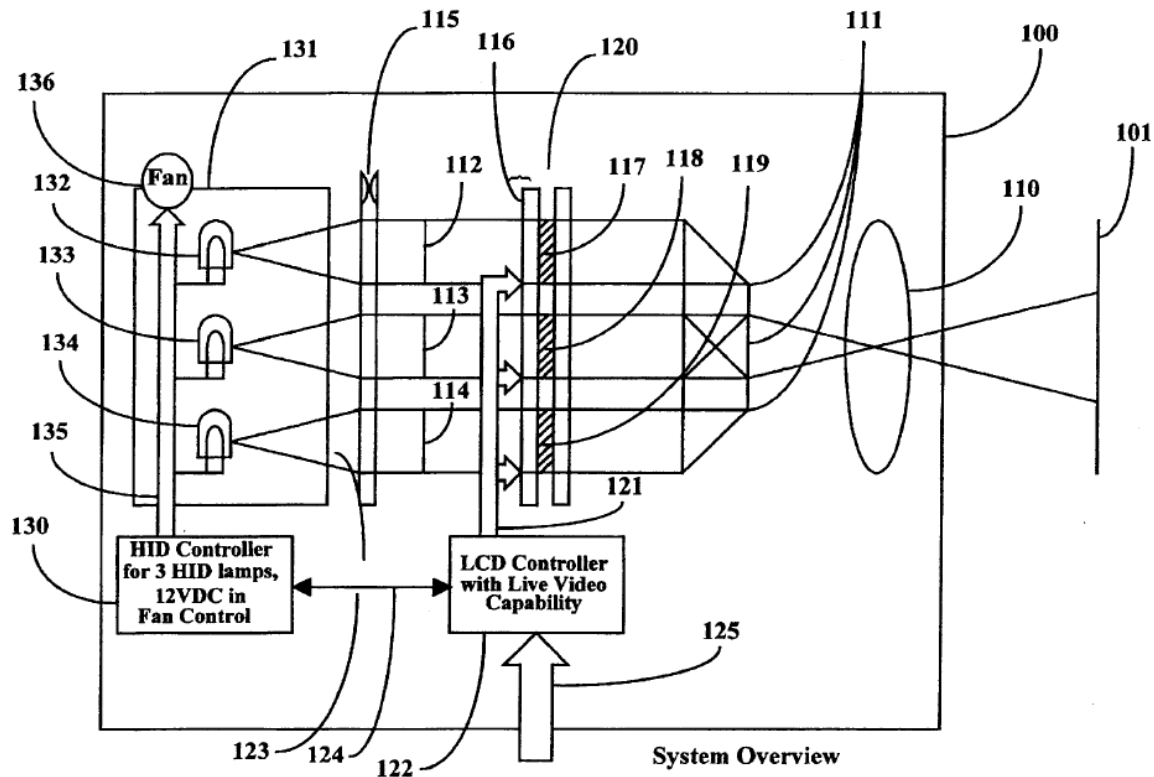
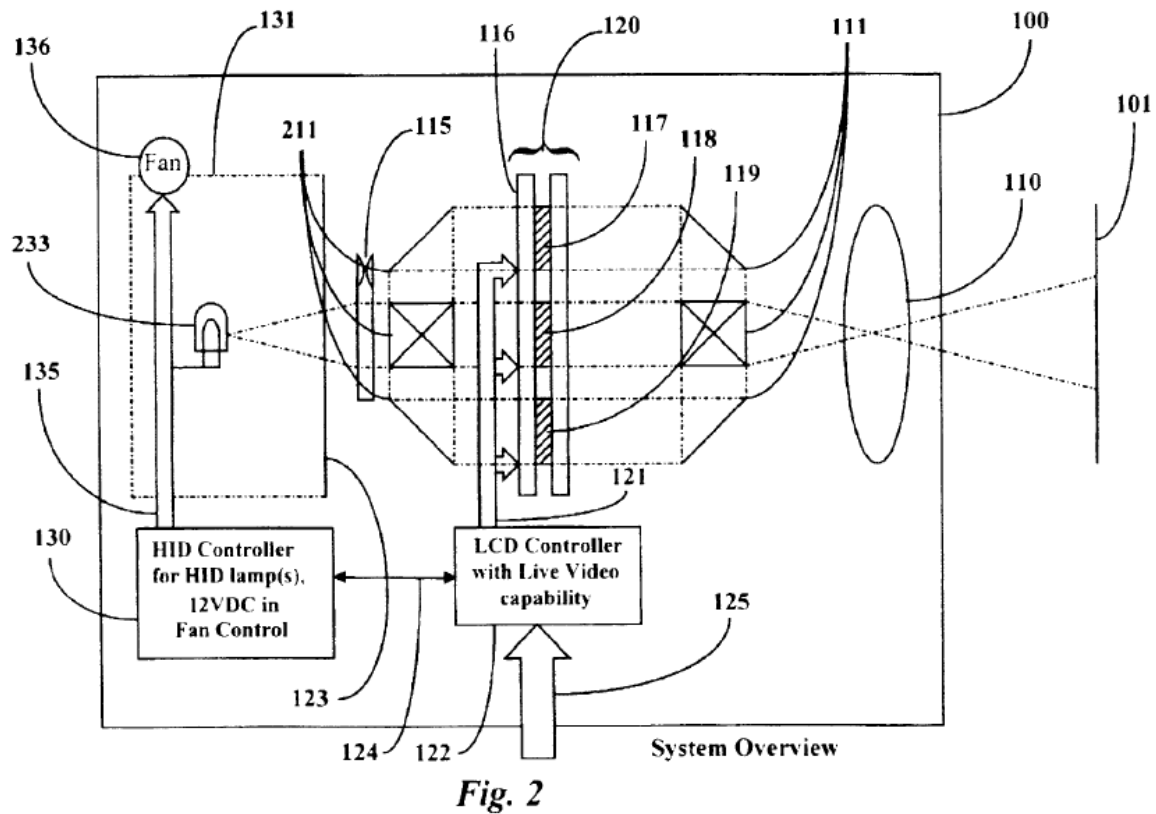


**Fig. 1**

Figure 1 depicts a video projector system comprising, *inter alia*, (A) lamps 132–134, which emit light; (B) condenser lens system 115, which focuses the three light beams emitted by the lamps; (C) red/green/blue filters 112–114, through which the respective light beams pass; (D) monochrome LCD arrays 117–119 in LCD unit 120; (E) controller 122, which controls the arrays; and (F) mirror and prism system 111, which combines the separate beams into a single beam for projection onto surface 101. *Id.* at col. 3, ll. 5–60.

Figure 2 of the '334 patent depicts another embodiment, and is reproduced below.



In the system depicted in Figure 2, single white-light source 233 is used instead of three lamps and the single white-light beam is split into red, green, and blue beams by prism system 211. *Id.* at col. 3, l. 61–col. 4, l. 1. The three light beams pass through “monochrome LCD array 120, which in this embodiment is controlled by controller 122 just as described for the first embodiment.” *Id.* at col. 4, ll. 8–12.

### *B. Illustrative Claims*

Claims 1 and 11 of the '334 patent are the only independent claims at issue:

1. A video projector system comprising:
  - a source projecting parallel beams of light of different colors;
  - a light-shutter matrix system comprising a number of equivalent switching matrices equal to the number of beams and placed one each in the beam paths;
  - a video controller adapted for controlling the light-shutter matrix system; and
  - an optical combination system adapted for combining the separate beams after the light-shutter matrix system into a single composite beam for projection on a surface to provide a video display.

11. A video projector system comprising:
  - a source projecting a beam of white light;
  - a splitter adapted to split the beam of white light into separate parallel beams of light of different colors;
  - a light-shutter matrix system comprising a number of equivalent switching matrices equal to the number of beams of light of different colors and placed one each in each beam path;
  - a video controller adapted for controlling the light-shutter matrix system; and
  - an optical combination system adapted for combining the separate beams after the light-shutter matrix system into a single composite beam for projection on a surface to provide a video display.

### *C. Prior Art*

The pending grounds of unpatentability in this *inter partes* review are based on the following prior art:

1. U.S. Patent No. 5,264,951, issued Nov. 23, 1993 (“Takanashi”) (Ex. 1002); and

2. U.S. Patent No. 5,287,131, issued Feb. 15, 1994  
("Lee") (Ex. 1003).

#### *D. Pending Ground of Unpatentability*

This *inter partes* review involves the following ground of unpatentability:

| References        | Basis              | Claims        |
|-------------------|--------------------|---------------|
| Takanashi and Lee | 35 U.S.C. § 103(a) | 1–6 and 11–14 |

## II. ANALYSIS

### *A. Claim Interpretation*

Consistent with the statute and legislative history of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), the Board interprets claims using the "broadest reasonable construction in light of the specification of the patent in which [they] appear[]." 37 C.F.R. § 42.100(b); *see also* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012). There is a "heavy presumption" that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002). However, a "claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history." *Id.* "Although an inventor is indeed free to define the specific terms used to describe his or her invention, this must be done with reasonable clarity, deliberateness, and precision." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Also, we must be careful not to read a particular embodiment appearing in the written

description into the claim if the claim language is broader than the embodiment. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993) (“limitations are not to be read into the claims from the specification”).

1. “*Light-Shutter Matrix System*”

In the Decision on Institution, based on the arguments presented by Xilinx in its Petition and by IV in its Preliminary Response, we interpreted the term “light-shutter matrix system” in claims 1 and 11 to mean a set of matrices, such as monochrome LCD arrays or cells of a monochrome LCD array, where each matrix comprises a rectangular arrangement of elements capable of limiting the passage of light. Dec. on Inst. 7–10. Xilinx agrees with this interpretation. Pet. Reply 3–4. IV argues that the interpretation is incorrect, and that “light-shutter matrix system” instead should be interpreted to mean “a two-dimensional array of elements that selectively admit and block light.” PO Resp. 6. IV further contends that the claimed “light-shutter matrix system” must be “an electrically addressed system,” and that in each matrix, “each of the elements that form[s] the matrix corresponds to an individual pixel of a display.” *Id.* at 12. As explained below, we are persuaded that our original interpretation should be modified slightly.

We begin with the language of the claims. Claim 1 recites a “light-shutter matrix system comprising a number of equivalent switching matrices equal to the number of beams and placed one each in the beam paths.” Claim 11 similarly recites a “light-shutter matrix system comprising a number of equivalent switching matrices equal to the number of beams of light of different colors and placed one each in each beam path.” Thus, the

“light-shutter matrix system” is made up of “equivalent switching matrices.” Dependent claims 6 and 14 further recite that “the light-shutter matrix system comprises a monochrome LCD array.” Therefore, based on the surrounding language of the claims, we know that the “light-shutter matrix system” is comprised of multiple equivalent matrices, and that one example of such a matrix is a monochrome LCD array.

The Specification of the ’334 patent unfortunately does not shed much light on the meaning of “light-shutter matrix system,” as it largely contains the same language as the claims. In the exemplary embodiment depicted in Figure 1, light passes through red/green/blue filters 112–114 and then through “three monochrome LCD arrays 117, 118, and 119” of LCD unit 120. Ex. 1001, col. 3, ll. 15–23. The three light beams are combined into a single beam and projected onto a surface. *Id.* at col. 3, ll. 26–29. Video controller 122 receives a “video signal” and “controls” monochrome LCD arrays 117–119. *Id.* at col. 3, ll. 36–41. In the embodiment shown in Figure 2, three color light beams pass through “cells of a monochrome LCD array.” *Id.* at col. 2, ll. 20–24. Reference numeral 120 in that embodiment denotes a single “monochrome LCD array 120” rather than an “LCD unit 120” comprising three monochrome LCD arrays as shown in Figure 1. *Id.* at col. 3, ll. 20–29; col. 4, ll. 1–12. The Specification does not describe in detail how the LCD arrays are operated or how they are controlled. The Specification also makes clear that the invention is not limited to the use of LCD arrays. See *id.* at col. 4, ll. 21–22 (“there are many ways to implement light shutter devices besides LCD’s”).

The parties do not argue that “light-shutter matrix system” as a whole is a term of art. As we did in the Decision on Institution, we look for

guidance to how a skilled artisan would have understood the individual terms “light-shutter” and “matrix.” See Dec. on Inst. 8–9. “Shutter” is defined as a “mechanical device that limits the passage of light; *esp[ecially]*: a camera attachment that exposes the film or plate by opening and closing an aperture.” MERRIAM-WEBSTER’S COLLEGIATE DICTIONARY 1084 (10th ed. 1993) (Ex. 3001). An LCD is an example of something that limits the passage of light. See S.W. AMOS ET AL., NEWNES DICTIONARY OF ELECTRONICS 186 (4th ed. 1999) (Ex. 3002) (“One way in which the applied voltage controls the light transmission of the device is by varying the light scattering in the liquid which is specially chosen because of its long-molecule construction.”). “Matrix” is defined in one dictionary as “something resembling a mathematical matrix *esp[ecially]* in rectangular arrangement of elements into rows and columns.” Ex. 3001 at 716.

IV does not dispute that the terms “shutter” and “matrix” should be given their ordinary meanings, such that each light-shutter matrix “comprises a rectangular arrangement of elements capable of limiting the passage of light.” PO Resp. 12. IV argues, however, that a person of ordinary skill in the art would have understood such a matrix to be “something quite specific”—namely, that the matrix must be “electrically addressed” and that “each of the elements that form[s] the matrix corresponds to an individual pixel of a display.” *Id.* As support, IV cites a 1985 book titled “Flat-Panel Displays and CRTs,” which shows an example of a “pixel display having individually addressable pixels,” and the declaration of Robert Smith-Gillespie, who testifies regarding “well-known video graphics array (VGA) displays hav[ing] a resolution of 640 X 480, for a total of 307,200 pixels.” *Id.* at 12–15 (citing Ex. 2012 at 19, 21; Ex. 2008

¶¶ 16–17). IV does not explain sufficiently why the recited “light-shutter matrix system,” given its broadest reasonable interpretation in light of the Specification of the ’334 patent, is limited to an electrically addressed system with individual pixels for display. The cited book does not use the term “light-shutter matrix system,” and Mr. Smith-Gillespie’s alleged VGA example does not show that a person of ordinary skill in the art would read “light-shutter matrix system” as requiring pixels in an electrically addressed matrix (rather than such an arrangement being merely an example). IV also disputes Dr. Buckman’s interpretation of the term “cell,” but does not state what impact (if any) that dispute has on the claim interpretation for “light-shutter matrix system.” See PO Resp. 9–11. We are not persuaded by IV’s arguments that the term “light-shutter matrix system” is limited to an electrically addressed system with individual pixels for display.

As in related Case IPR2013-00029, however, we are persuaded that our interpretation in the Decision on Institution should be modified slightly in two respects. See *Xilinx, Inc. v. Intellectual Ventures I LLC*, IPR2013-00029, slip op. at 11–12 (PTAB Mar. 10, 2014) (Paper 49, “IPR2013-00029 Final Dec.”). First, in the Decision on Institution, we referred to the following dictionary definition of “matrix”: “something resembling a mathematical matrix esp[ecially] in rectangular arrangement of elements into rows and columns.” Ex. 3001 at 716; see Dec. on Inst. 9. In Case IPR2013-00029, IV provided the following definitions for the term “matrix”: “[a] rectangular array of numeric or algebraic quantities subject to mathematical operations,” and “[s]omething resembling such an array, as in

the regular formation of elements into columns and rows.”<sup>2</sup> See IPR2013-00029 Final Dec. 11. Based on the latter definition, a “matrix” is merely a two-dimensional array (i.e., rows and columns), and need not be in a “rectangular” form specifically. IV’s dictionary definition of “matrix” is the appropriate one under the circumstances because it is broader than the dictionary definition cited in the Decision on Institution, and we must determine the broadest reasonable interpretation in light of the Specification. Thus, we modify our interpretation to eliminate any requirement of a “rectangular” shape. Second, a monochrome LCD array, which is an example of a light-shutter matrix (as recited in dependent claims 6 and 14), has many different optical properties, but must actually be used as a “shutter” (i.e., used to limit the passage of light) and not for some other optical effect. See *id.* at 11–12. Thus, we modify our interpretation to state that the device selectively limits the passage of light, rather than being merely capable of doing so.

Applying the broadest reasonable interpretation of the claims in light of the Specification, we interpret “light-shutter matrix system” to mean a set of matrices, such as monochrome LCD arrays or cells of a monochrome LCD array, where each matrix comprises a two-dimensional array of elements that selectively limit the passage of light.<sup>3</sup>

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<sup>2</sup> A copy of the definitions submitted by IV in Case IPR2013-00029 is provided as Exhibit 3003 in this proceeding.

<sup>3</sup> In related Case IPR2013-00029, we interpreted “light-shutter matrix system” in the claims of the ’545 patent similarly to mean “a set of matrices, such as monochrome LCD arrays, where each matrix comprises a two-dimensional array of elements that selectively limit the passage of light.” IPR2013-00029 Final Dec. 8–12.

## 2. “*Equivalent Switching Matrices*”

In the Decision on Institution, based on the arguments presented by Xilinx in its Petition and by IV in its Preliminary Response, we interpreted the term “equivalent switching matrices” in claims 1 and 11 to mean switching matrices that are corresponding or virtually identical in effect or function. Dec. on Inst. 12. Xilinx agrees with this interpretation. Pet. Reply 5–6. IV argues that “equivalent switching matrices” should be interpreted according to its ordinary and customary meaning to mean “switching matrices that are virtually identical in effect or function.” PO Resp. 18–20. IV further contends that “equivalent switching matrices” are “not the same as conventional color-specific switching matrices,” citing the following portion of the Specification of the ’334 patent:

In various embodiments, assuming projectors of relatively equal cost, by using a triple monochrome LCD structure instead of a color AM-LCD, and precoloring of light, more light output can be achieved than in conventional systems. Systems according to embodiments of the invention are also less expensive than conventional color LCD systems, because the monochrome LCDs used are less expensive than color LCDs, and because alignment of components is less critical than in conventional LCD projection systems.

*Id.* at 18–19 (citing Ex. 1001, col. 2, ll. 7–15).

We agree with IV that the ordinary and customary meaning of the term “equivalent” applies to claims 1 and 11. IV provided, with its Preliminary Response, a dictionary definition of “equivalent” as “corresponding or virtually identical esp[ecially] in effect or function.” Ex. 2001 at 392–93; see Paper 12 at 18–19. The dictionary definition is indicative of the ordinary and customary meaning of “equivalent,” and also is consistent with the Specification of the ’334 patent, which describes

“three monochrome LCD arrays 117, 118, and 119” for the colors red, green, and blue. *See* Ex. 1001, col. 3, ll. 20–23. IV’s proposed interpretation, however, omits the word “corresponding” from the dictionary definition. Further, we are not persuaded by IV’s argument that “equivalent switching matrices” must be interpreted to exclude “conventional color-specific switching matrices.” PO Resp. 18–19; *see* Ex. 2008 ¶ 19. The portion of the Specification cited by IV does not use the word “equivalent,” and, in any case, merely refers to “embodiments” of the disclosed invention. *See* Ex. 1001, col. 2, ll. 7–15. Thus, we do not read the Specification language as limiting the term “equivalent switching matrices.” Applying the broadest reasonable interpretation of the claims in light of the Specification, we interpret “equivalent switching matrices” to mean switching matrices that are corresponding or virtually identical in effect or function.<sup>4</sup>

3. *“Video Controller Adapted for Controlling the  
Light-Shutter Matrix System”*

In the Decision on Institution, we interpreted the phrase “video controller adapted for controlling the light-shutter matrix system” in claims 1 and 11 to mean a component that controls the light-shutter matrix system to facilitate the display of video. Dec. on Inst. 10–12. Xilinx agrees with this interpretation. Pet. Reply 5. IV argues that the Board’s interpretation is too broad in view of the Specification of the ’334 patent, which provides:

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<sup>4</sup> In related Case IPR2013-00029, we interpreted “equivalent switching matrices” in the claims of the ’545 patent similarly to mean “switching matrices that are corresponding or virtually identical in effect or function.” IPR2013-00029 Final Dec. 12–13.

“A video signal for the system is delivered from outside via link 125 into a controller 122. . . . Controller 122 controls the three monochrome matrices 117, 118, and 119.” PO Resp. 16–17 (citing Ex. 1001, col. 3, ll. 36–40) (emphasis omitted). IV also cites the Abstract of the ’334 patent, which recites that “[t]he LCD array is switched by a controller driven in accordance with a video signal.” *Id.* (citing Ex. 1001, Abstract). IV asserts that “video controller” should be interpreted to mean “a component that controls light-shutter matrices to facilitate the display of video in accordance with a video signal.” *Id.* at 17 (emphasis omitted).

We disagree. The portion of the Specification cited by IV describes an exemplary embodiment of the invention and does not define explicitly the phrase “video controller adapted for controlling the light-shutter matrix system.” See Ex. 1001, col. 2, ll. 36–38. Indeed, the Specification states that “[t]here are many ways adequate controllers may be implemented.” *Id.* at col. 4, ll. 23–24. Further, unlike claims 7 and 9, which are not part of this *inter partes* review, the challenged claims do not recite a “video signal.” We see no basis to import a “video signal” requirement into the claims based on the exemplary embodiment’s use of a video signal. Applying the broadest reasonable interpretation of the claims in light of the Specification, we interpret “video controller adapted for controlling the light-shutter matrix system” to mean a component that controls the light-shutter matrix system to facilitate the display of video.<sup>5</sup>

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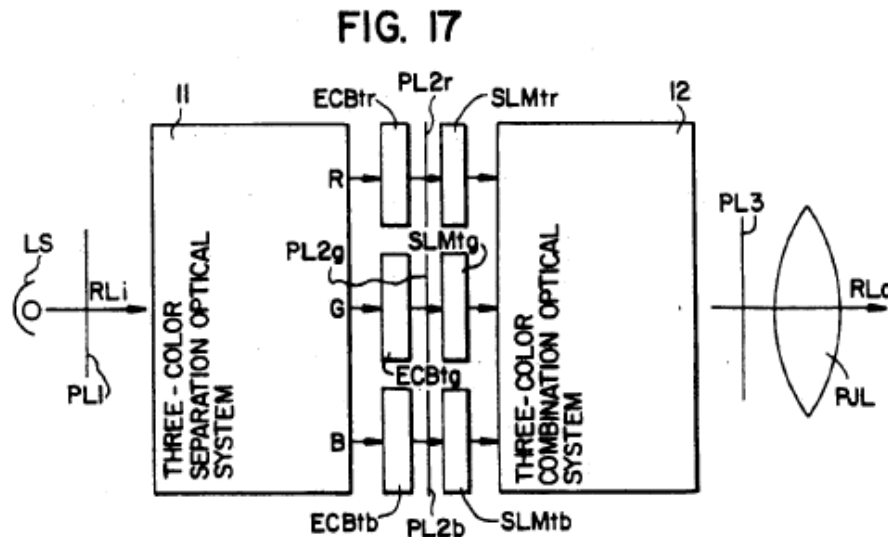
<sup>5</sup> In related Case IPR2013-00029, we interpreted “video controller adapted for controlling the light-shutter matrices” in the claims of the ’545 patent similarly to mean “a component that controls light-shutter matrices to facilitate the display of video.” IPR2013-00029 Final Dec. 13–14.

*B. Claims 1–6 and 11–14 are Unpatentable Over Takanashi and Lee*

With respect to the alleged obviousness of claims 1–6 and 11–14 over Takanashi and Lee, we have reviewed Xilinx’s Petition, IV’s Patent Owner Response, and Xilinx’s Reply, as well as the evidence discussed in each of those papers. We are persuaded, by a preponderance of the evidence, that claims 1–6 and 11–14 are unpatentable over Takanashi and Lee under 35 U.S.C. § 103(a). See Pet. 21–32, 35–37; Ex. 1005 ¶¶ 22–27.

*1. Takanashi*

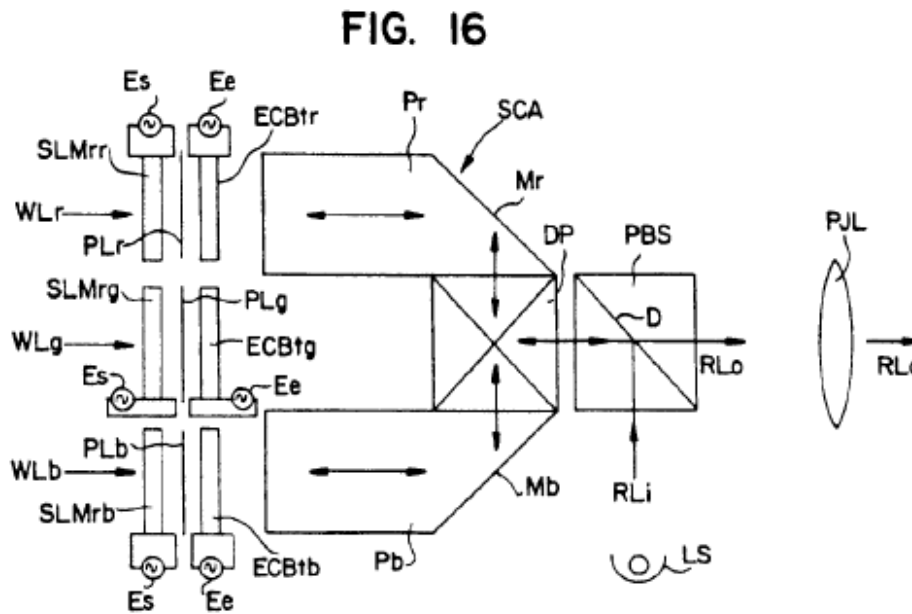
Takanashi discloses a “spatial light modulator and a display unit in which the spatial light modulator is applied.” Ex. 1002, col. 1, ll. 8–10. Figure 17 of Takanashi is reproduced below.



As shown in Figure 17, light source LS emits light, which is linearly polarized by polarizer PL1 and separated into red, green, and blue components by three-color separation optical system 11. *Id.* at col. 16, ll. 1–14. Each respective light beam then passes through a liquid crystal element (e.g., ECBtr for red light), polarizer (e.g., PL2r for red light), and

spatial light modulator element (e.g., SLMtr for red light), which “modulate[s]” the respective light beam through the use of incoming “write light WL.” *Id.* at col. 16, ll. 6–28; col. 1, l. 18–col. 5, l. 25; Figs. 1–3. The light beams then are recombined by three-color combination optical system 12, and the combined light passes through another polarizer PL3 and projection lens PjL, which projects the combined light onto a screen (not shown). *Id.* at col. 16, ll. 29–42.

Takanashi discloses a particular projection system using spatial light modulators and prisms, as shown in Figure 16 reproduced below.



In Figure 16, light emitted by light source LS is incident on dichroic prism DP, which separates the light into red, green, and blue components before being transmitted to the ECB, PL, and SLM elements. *Id.* at col. 15, ll. 30–43. For example, green light “is transmitted through the liquid crystal element ECBtg and the polarizer PLg and [is] incident on the modulator element SLMrg.” *Id.*

2. Lee

Lee discloses a “projection color liquid crystal display (LCD) system us[ing] a large reflecting liquid crystal (LC) panel as a screen.” Ex. 1003, Abstract. Figure 2 of Lee is reproduced below.

FIG.2

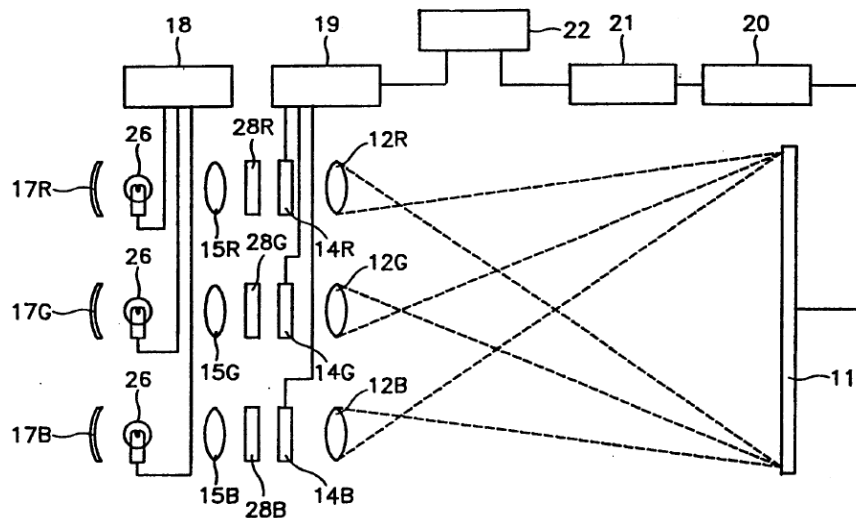


Figure 2 depicts an LCD projection system comprising white light sources 26, focusing lenses 15R/G/B, red/green/blue color filters 28R/G/B, light shutters 14R/G/B, diffusing lenses 12R/G/B, and LC panel 11. *Id.* at col. 3, l. 14–col. 4, l. 26. The system is controlled by a number of components. Lamp voltage controlling circuit 18 controls the intensity of the light emitted by light sources 26. *Id.* at col. 3, ll. 14–19. Light shutter controlling circuit 19 “successively permits a respective unicolor light beam connected to a respective light shutter 14R, 14G, 14B to pass therethrough during the frequency of 1/3,” and prevents the light beam from passing through during the other 2/3 of the time. *Id.* at col. 3, ll. 27–33. LC panel 11 is controlled by frame inducing circuit 22, image controlling circuit 21, and LCD driver 20 in the following manner:

The LC panel 11 is successively connected to a liquid crystal display LCD driver 20 to drive the panel; an image controlling circuit 21 to supply a driving signal based on a color information of respective color with the driver 20; and a frame inducing circuit 22 to induce the respective light shutter 14R, 14G, 14B and image controlling circuit 21.

*Id.* at col. 3, ll. 46–52. Red, green, and blue light beams are successively projected through light shutters 14R/G/B, and successively reflected from LC panel 11 according to a “color driving signal” supplied by image controlling circuit 21 and used by LCD driver 20 to drive LC panel 11. *Id.* at col. 3, ll. 53–61. The light beams are projected and reflected so quickly that a person viewing LC panel 11 sees a composite image rather than successive colors. *Id.* at col. 3, ll. 62–66.

### 3. Analysis

Xilinx relies on Takanashi as allegedly teaching the “source,” “splitter,” “light-shutter matrix system,” and “optical combination system” limitations of independent claims 1 and 11, and relies on Lee as allegedly teaching the “video controller” limitations. Pet. 22–26, 28–30, 35–36. There is no dispute that Takanashi and Lee teach most of the limitations of claims 1 and 11. For example, Takanashi teaches a “source projecting parallel beams of light of different colors” (light source LS producing parallel red, green, and blue light beams via three-color separation optical system 11 in Figure 17) and an “optical combination system” (three-color combination optical system 12 in Figure 17), as recited in claim 1. *See id.* at 23, 25–26. IV argues that Takanashi and Lee fail to teach or suggest three limitations of claims 1 and 11: a “light-shutter matrix system,” “equivalent switching matrices,” and a “video controller adapted for controlling the

light-shutter matrix system.” PO Resp. 20–37. IV does not argue that Takanashi and Lee fail to teach or suggest the additional limitations of dependent claims 2–6 and 12–14.

*a. Light-Shutter Matrix System*

Xilinx identifies “Takanashi’s combination of ECB elements, polarizers PL, and SLM elements” as a “light-shutter matrix system.” Pet. 23–24. Specifically, Xilinx contends that the ECBtr, PL2r, and SLMtr components shown in Figure 17 above are a switching matrix used to process the red beam of light, and the corresponding components are switching matrices for the green and blue light beams. *Id.*; see Ex. 1005 ¶ 18.

IV argues that Takanashi lacks the “matrix” aspect of a “light-shutter matrix system.” PO Resp. 20–27. IV contends that the spatial light modulator SLM is not a “matrix” in the form of rows and columns because it is a continuous layer of material, citing Takanashi’s disclosure that the SLM is “formed as an element.” *Id.* at 23–24 (citing Ex. 1002, col. 2, ll. 33–44). IV further argues that, even though Takanashi discloses projecting a two-dimensional color image, a continuous layer of optical material, such as a “film frame” or “overhead projector sheet with writing,” can produce a two-dimensional image despite not being in “matrix” form. *Id.* at 22–23; see Ex. 1002, col. 16, ll. 38–42; Figs. 17, 20.

Xilinx responds with testimony from Dr. Buckman comparing the “optically-addressed” spatial light modulator (OASLM) of Takanashi with an “electrically-addressed” spatial light modulator (EASLM), such as an LCD array of the type disclosed in the Specification of the ’334 patent. See

Pet. Reply 7–8 (citing Ex. 1012 ¶¶ 20–26). An OASLM uses a read light and a write light. Ex. 1012 ¶¶ 20–21. The write light is directed at a photosensitive material in the SLM, which creates an electric charge that changes the state of the adjacent liquid crystal layer. *Id.* An image is created by shining the write light at some points and not others. *Id.* The read light passes through or reflects off of the SLM, taking on the same image as the write light by virtue of the liquid crystal layer. *Id.* Similarly, in an EASLM, an electric charge is created at particular points by electric circuitry (e.g., transistors and capacitors) adjacent to the liquid crystal layer. *Id.* ¶ 21. Dr. Buckman’s testimony is supported by textbook descriptions of OASLMs and LCDs (an example of an EASLM), and we find it persuasive. *See* Ex. 1015 at 310–31; Ex. 3002 at 186.

We are not persuaded by IV’s argument that the SLM in Takanashi is not a “matrix” because it has a continuous liquid crystal layer. *See* PO Resp. 22–23. Mr. Smith-Gillespie acknowledged during his deposition that the LCD arrays in the Specification of the ’334 patent have continuous liquid crystal layers. Ex. 1014 at 174:4–11. In both the LCD array of the exemplary embodiment of the ’334 patent and the OASLM described in Takanashi, the “light-shutter” (i.e., what actually limits the passage of light) is the liquid crystal layer itself, and the liquid crystal layer operates the same way by changing state in response to an electric charge. Only the mechanism for encoding the image is different—in the LCD array, the charge image is created by the electric circuitry, whereas in Takanashi, the charge image is created by the write light hitting the photosensitive material. Thus, the fact that Takanashi has a continuous liquid crystal layer is immaterial. What matters is whether that layer, like the layer in the LCD

array of the '334 patent, is configured as a “matrix” (i.e., a two-dimensional array) of elements that selectively limit the passage of light.

We conclude, by a preponderance of the evidence, that a person of ordinary skill in the art would have understood the SLM in Takanashi to be configured as a “matrix.” Takanashi discloses a two-dimensional “color image of the object of display” projected onto a screen, but does not state explicitly that its input write light is in the form of a two-dimensional array. *See* Ex. 1002, col. 16, ll. 38–42; Figs. 17, 20. According to Dr. Buckman, the reason for this is that an SLM “was a commonly-known device . . . in the early 1990s.” Ex. 1012 ¶ 20. Dr. Buckman states that typical OASLMs create images by “organizing the continuous liquid crystal layer into a pixelated matrix of rows and columns” where each pixel “permits or limits the passage of light according to the electric field near that location.” *Id.* ¶ 22. Dr. Buckman further testifies that using a cathode ray tube (CRT) was one known way of providing a write light with an OASLM, and that the write light for an OASLM would “usually” be from a CRT. *Id.* ¶¶ 21–25. A CRT shines a moving light beam at an OASLM to create an image made up of individual pixels in rows and columns. *Id.* ¶ 23.

Dr. Buckman’s testimony regarding the operation of OASLMs and CRTs is supported by two textbooks, and we find it persuasive. *See id.* ¶¶ 23–24; Ex. 1015 at 331 (OASLMs used with CRTs), 552–55; Ex. 2012 at 24–25 (CRT scan addressing). We are persuaded that a person of ordinary skill in the art, reading the OASLM disclosure of Takanashi and being aware of how OASLMs typically operated, would have understood that the write light in Takanashi is pixelated (i.e., organized into rows and columns). Shining such a write light at the OASLM in Takanashi configures the

continuous liquid crystal layer into a “matrix” of elements that selectively limit the passage of light, just as the circuitry in an EASLM configures a continuous liquid crystal layer into a “matrix” of elements. Takanashi, therefore, teaches the “matrix” aspect of the “light-shutter matrix system” recited in claims 1 and 11.

IV disputes Dr. Buckman’s conclusions, asserting that the “characteristics that make a device a ‘matrix’ device are inherent in the structural components that form the device, and in no way depend upon whether the device is powered on, or driven.” PO Resp. 24–27. According to IV and Mr. Smith-Gillespie, a person of ordinary skill in the art would have understood that a device is a “matrix” device or not, and applying a write light cannot transform a non-“matrix” device into a “matrix” device. *Id.* (citing Ex. 2008 ¶ 24). As explained above, we do not agree with IV that the term “light-shutter matrix system” requires an electrically addressed system (which would have structural components forming the device itself arranged in a matrix format). *See supra* Section II.A.1. We see no reason why the OASLM in Takanashi, which is configured into a “matrix” of elements (albeit in a different way from an EASLM), cannot constitute a “light-shutter matrix.”

We are persuaded, by a preponderance of the evidence, that Takanashi and Lee teach a “light-shutter matrix system,” as recited in claims 1 and 11.

#### *b. Equivalent Switching Matrices*

IV argues that Takanashi does not teach a light-shutter matrix system comprising “equivalent switching matrices.” PO Resp. 29–37. IV asserts that each of the combinations of ECB, PL2, and SLM elements in Takanashi

is a particular “kind” of wavelength selection filter that “passes only specific monochromatic light.” *Id.* at 29–32 (citing Ex. 1002, col. 18, ll. 34–44) (emphasis omitted). According to IV, this type of filter system is different from the “triple monochrome LCD structure” disclosed in the Specification of the ’334 patent and does not provide the same advantages, such as increased brightness and quality at reduced cost. *Id.* at 31–32. IV contends that Xilinx fails to address how Takanashi provides those advantages. *Id.* IV further argues that the combinations of elements in Takanashi do not correspond to each other in “effect” because they produce different colors of light, and do not correspond to each other in “function” because each filters out different colors of light. *Id.* at 33–37. If the function of the wavelength selection filters in Takanashi was “to filter light generally,” there would be no need for separate red, blue, and green wavelength selection filters according to IV. *Id.* at 35. Similarly, the devices are not virtually identical to each other because using one in place of another would not work due to their specific color properties. *Id.* at 35–37.

We first note that none of the purported advantages described in the Specification of the ’334 patent are required by the claims. Claims 1 and 11 merely require that the light-shutter matrix system be made up of “equivalent switching matrices,” which we interpret to mean switching matrices that are corresponding or virtually identical in effect or function. *See supra* Section II.A.2.

Further, IV is correct that each combination of elements in Takanashi passes only light of a particular color (red, green, or blue), *see, e.g.*, Ex. 1002, col. 18, ll. 35–44, but that does not mean that the elements are not corresponding or virtually identical in effect or function. The SLMs are

referenced in Takanashi with the same abbreviation (e.g., “SLMrr,” “SLMrg,” and “SLMrb” in Figure 16), and each uses a write light to encode an image onto a read light. *See id.* at col. 15, l. 22–col. 16, l. 42; Figs. 16, 17. There does not appear to be—and IV does not point to—any difference between the devices apart from the difference in light color. We are persuaded that the combinations of elements are “virtually identical” or, at minimum, “corresponding.” Importantly, claims 1 and 11 do not require that the matrices be identical, just that they be “equivalent.” IV’s position requires them to be identical.

We also note that the challenged claims require the light-shutter matrices to receive light of different colors, just as in Takanashi. For example, claim 1 recites “parallel beams of light of different colors,” claim 2 recites the three parallel light beams passed through “three color filters,” and claim 3 recites that the three color filters are “red, green, and blue.” Thus, the fact that the element combinations in Takanashi are wavelength-specific does not mean they cannot be “equivalent” switching matrices as IV suggests.

Finally, as Xilinx points out, Mr. Smith-Gillespie acknowledged that the distinction made in the Specification of the ’334 patent was between a triple monochrome LCD structure and a color AM-LCD, not between a triple monochrome LCD structure and an OASLM of the type described in Takanashi. *See* Pet. Reply 10; Ex. 1014 at 219:23–222:15 (referring to Ex. 2008 ¶ 28). Thus, IV’s purported distinction in terms of functionality and advantages of “equivalent” switching matrices is incorrect.

We are persuaded, by a preponderance of the evidence, that Takanashi and Lee teach “equivalent switching matrices,” as recited in claims 1 and 11.

*c. Video Controller Adapted for Controlling the Light-Shutter Matrix System*

IV argues that Takanashi and Lee do not teach a “video controller adapted for controlling the light-shutter matrix system,” as recited in claims 1 and 11. PO Resp. 27–29. Before analyzing whether the limitation is taught by the references, we summarize the history of the parties’ arguments.

In its Petition, Xilinx argued that, although Takanashi does not describe explicitly how it controls the light-shutter matrices to encode an image, it was known in the art to use a controlling circuit to control devices that modify light beams. Pet. 21, 24–25. Xilinx then cited light shutter controlling circuit 19 in Lee as a “video controller,” and argued that incorporating it into the system of Takanashi would have been an obvious modification. *Id.* at 24-25.

During a deposition in related Case IPR2013-00029 on June 11, 2013, Dr. Buckman testified that light shutter controlling circuit 19 controls light shutters 14R/G/B as a “color wheel,” successively allowing red, green, and blue light to pass through, each 1/3 of the time. Ex. 2011 at 23:25–24:14. Dr. Buckman testified that a color wheel controller is *not* a “video controller.” *Id.* at 25:6–10. Subsequently, during a deposition in this proceeding on August 7, 2013, Dr. Buckman testified that he made a mistake in citing light shutter controlling circuit 19 in Lee as the claimed “video controller,” and identified LCD driver 20 and image controlling circuit 21 instead. Ex. 2010 at 37:13–38:14.<sup>6</sup>

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<sup>6</sup> On November 2, 2013, IV filed an unopposed motion to file a substitute, signed copy of the deposition transcript as Exhibit 2010 and expunge the original, unsigned copy filed on August 27, 2013. Paper 33. The substitute version will be entered and the original expunged.

IV then filed its Patent Owner Response on August 27, 2013, arguing that light shutter controlling circuit 19 is not a “video controller” based on Dr. Buckman’s admission. PO Resp. 27–29.

In its Reply, Xilinx admitted that Dr. Buckman was mistaken in his original declaration, and argued that “[t]he actual video controller in Lee is the LCD driver 20 and the image controlling circuit 21.” Pet. Reply 9. Xilinx also served, with its Reply, a reply declaration from Dr. Buckman where Dr. Buckman testified that “[c]ircuits 20 and 21 in Lee are one example of a video controller.” Ex. 1012 ¶ 27. IV then deposed Dr. Buckman again and questioned him about the various components in Lee. See Ex. 2018 at 44:4–48:17.

At the oral hearing, IV argued that it would be prejudiced if Xilinx is permitted to change its position regarding what it alleges to be the “video controller” in Lee because IV had no opportunity to respond after Xilinx’s Reply. See, e.g., Tr. 38:7–43:21.

As an initial matter, we are cognizant of the fact that Dr. Buckman’s opinion regarding what he believed to be a “video controller” in Lee changed between the time of the Petition (on which the Board instituted a trial) and the time of his depositions. Under the circumstances, Dr. Buckman’s changed opinion goes to his weight and credibility, and we give his testimony on the issue little weight. Nevertheless, the Board’s mandate in an *inter partes* review is to “issue a final written decision with respect to the patentability of any patent claim challenged by the petitioner.” 35 U.S.C. § 318(a). We do so based on the entire record before us. Thus, we must determine based on the existing record whether claims 1 and 11 are

patentable over Takanashi and Lee, which includes an inquiry into whether the references teach the “video controller” limitation.

After reviewing the entirety of the record, we are persuaded, by a preponderance of the evidence, that Takanashi and Lee teach a “video controller adapted for controlling the light-shutter matrix system,” as recited in claims 1 and 11. As explained above, we interpret the phrase to mean a component that controls the light-shutter matrix system to facilitate the display of video. *See supra* Section II.A.3. Lee discloses that image controlling circuit 21 “suppl[ies] a driving signal based on a color information of respective color with the driver 20,” and “LC panel 11 is successively connected to . . . LCD driver 20 to drive the panel.” Ex. 1003, col. 3, ll. 46–52. Thus, Lee teaches that LCD driver 20 and image controlling circuit 21 control LC panel 11 and cause it to display video.

As to the combination of Takanashi and Lee, Xilinx contends that the SLM components in Takanashi discussed above are a “light-shutter matrix.” *See supra* Section II.B.3.a. A person of ordinary skill in the art would have understood that a working video projector system, like the one described in Takanashi, must have something to control the display of the video. The SLMs in Takanashi must be controlled by something; if they were not, they could not produce a dynamic projected image. Further, Mr. Smith-Gillespie testified that “any real video projection system in 1996 would have had a video controller,” and that devices existed at the time to “take in video and then pass it along to some other device in the system that would drive . . . the liquid crystal displays.” Ex. 1014 at 206:8–11, 209:6–22. Based on Lee’s disclosure of components that control an LCD panel (an example of an SLM) to facilitate the display of video, the need for something to control the

operation of the SLMs in Takanashi, and Mr. Smith-Gillespie's testimony regarding the existing knowledge at the time, we are persuaded that it would have been obvious to include a component in Takanashi's system that controls the SLMs to facilitate the display of video. Doing so would have been within the level of ordinary skill in the art and would have amounted to combining known elements according to their established functions, yielding predictable results. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416–18 (2007).

We are persuaded, by a preponderance of the evidence, that Takanashi and Lee teach a “video controller adapted for controlling the light-shutter matrix system,” as recited in claims 1 and 11, and that claims 1 and 11 would have been obvious over Takanashi and Lee.

#### *d. Conclusion*

Based on the record evidence, in light of the arguments presented, Xilinx has shown, by a preponderance of the evidence, that claims 1 and 11, as well as claims 2–6 and 12–14 depending therefrom, which IV does not argue separately in its Patent Owner Response, would have been obvious over Takanashi and Lee.

#### *C. IV's Motion to Amend*

In its Motion to Amend, IV proposes substitute claim 15, “contingent on Claim 3 being found unpatentable,” and substitute claim 16, “contingent on Claim 12 being found unpatentable.” Mot. to Amend 1. We determine that claims 3 and 12 are unpatentable and, therefore, reach the merits of IV's motion.

As the moving party, IV bears the burden of proof to establish that it is entitled to the relief requested. 37 C.F.R. § 42.20(c). Entry of the proposed amendments is not automatic, but occurs only upon IV's having demonstrated the patentability of those claims.

Proposed substitute claim 15 includes all of the limitations of claim 3, and adds the following limitations: “a second controller adapted to control the three white-light sources,” and “a control link adapted to connect the video controller to the second controller to provide individualized variable control of each of the three white-light sources.” Mot. to Amend 1–2.<sup>7</sup> Proposed substitute claim 16 similarly adds the following limitations to claim 12: “a second controller adapted to control the source,” and “a control link adapted to connect the video controller to the second controller to provide variable control of the source.” *Id.* at 2. Proposed substitute claim 16 also removes the following language from claim 12: “wherein the splitter divides the beam of white light into three separate beams of colored light, one red, one green, and one blue.” *Id.*

### *1. Written Description Support*

Pursuant to 37 C.F.R. § 42.121(b), a motion to amend in an *inter partes* review must set forth “[t]he support in the original disclosure of the patent for each claim that is added or amended,” and “[t]he support in an earlier-filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought.” In its motion, IV explains how the subject matter of its proposed substitute claims have written description

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<sup>7</sup> Substitute claim 15 also corrects the preamble of claim 3 to recite “video projector system,” as in parent claim 1, rather than “system.”

support in the specification of U.S. Patent Application No. 08/780,351 (“the ’351 application”), which issued as the ’334 patent, as filed, as well as U.S. Patent Application No. 08/686,809 (“the ’809 application”), which issued as the ’545 patent (the parent of the ’334 patent), as filed. Mot. to Amend 8–11 (citing Exs. 1007, 2007). Regarding the added limitations, IV relies on Figure 1 of the ’351 and ’809 applications, and the accompanying description of controller 130 and control link 124. *Id.* (citing Ex. 1007 at 10–11, 19–20; Ex. 2007 at 10–11, 17). IV also cites support in the ’351 and ’809 applications for the other limitations of the claims. *Id.* at 11 (citing Ex. 1007 at 19–20; Ex. 2007 at 17). We conclude that IV has made a sufficient showing that proposed substitute claims 15 and 16, as a whole, have written description support in the disclosures of the ’351 and ’809 applications as filed.

## 2. Claim Interpretation

The patent owner bears the burden in a motion to amend to show a patentable distinction of each proposed substitute claim over the prior art. *See* 37 C.F.R. § 42.20(c). Accordingly, a “patent owner should identify specifically the feature or features added to each substitute claim, as compared to the challenged claim it replaces, and come forward with technical facts and reasoning about those feature(s).” *Idle Free Sys., Inc. v. Bergstrom, Inc.*, IPR2012-00027, slip op. at 7 (PTAB June 11, 2013) (Paper 26, “*Idle Free*”). This includes “construction of new claim terms, sufficient to persuade the Board that the proposed substitute claim is patentable over the prior art of record, and over prior art not of record but known to the patent owner.” *Id.*

In its Motion to Amend, IV argues that all of the claim limitations in the proposed substitute claims should be interpreted “in accordance with their plain and ordinary meaning.” Mot. to Amend 9. IV does not provide a proposed interpretation for any term. Given the language used in proposed substitute claims 15 and 16, we are not persuaded that IV has met its burden to demonstrate patentability. Specifically, IV failed to provide an interpretation for “second controller adapted to control the three white-light sources” and “control link adapted to connect the video controller to the second controller to provide individualized variable control of each of the three white-light sources,” as recited in claim 15, or the similar phrases in claim 16, and only addressed the phrases for the first time in its Reply. See PO Reply 2–3. We conclude that interpreting both phrases of each claim is critical to determining whether the proposed substitute claims are patentable, and that IV failed to meet its burden by not addressing them in its Motion.

In any event, as explained below, even if IV’s arguments regarding claim interpretation and patentability in its Reply are considered, IV has not met its burden of showing that the proposed substitute claims are patentable.

*a. “Second Controller” Limitations*

Proposed substitute claim 15 recites a “second controller adapted to control the three white-light sources,” and proposed substitute claim 16 recites a “second controller adapted to control the source.” Mot. to Amend. 1–2. Xilinx contends that “second controller” in both claims should be interpreted to mean “one or more control circuits separate from the video controller.” Pet. Opp. 9; see Ex. 1011 ¶ 25. IV contends, in its Reply, that the full phrase “second controller adapted to control the three white-light

sources” in claim 15 means “a controller, other than the video controller, that controls the three white-light sources.” PO Reply 2–3; *see* Ex. 2019 ¶ 15. IV does not provide an interpretation for “second controller adapted to control the source” in claim 16, but Mr. Smith-Gillespie testifies that the phrase should be interpreted to mean “a controller, other than the video controller, that controls the source.” Ex. 2019 ¶ 15.

The Specification of the ’334 patent does not describe a “second controller” specifically, but discloses that controller 130 controls lamps 132–134, and “control link 124 is provided between controllers 122 and 130.” *See* Ex. 1001, col. 3, ll. 5–10, 57–60; Fig. 1. Thus, controller 130 is distinct from controller 122, which controls the LCD arrays. *See id.* at col. 3, ll. 36–41. “Controller” also appears to be used in accordance with its ordinary meaning of something that controls. Thus, applying the broadest reasonable interpretation in light of the Specification, we interpret “second controller adapted to control the three white-light sources” in claim 15 to mean something separate from the video controller that is adapted to control the three white-light sources, and interpret “second controller adapted to control the source” in claim 16 to mean something separate from the video controller that is adapted to control the source.

*b. “Control Link” Limitations*

Proposed substitute claim 15 recites a “control link adapted to connect the video controller to the second controller to provide individualized variable control of each of the three white-light sources,” and proposed substitute claim 16 recites a “control link adapted to connect the video controller to the second controller to provide variable control of the source.”

Mot. to Amend 1–2. Xilinx contends that “control link” should be interpreted to mean “an electronic connection between the video controller and another controller.” Pet. Opp. 9; *see* Ex. 1011 ¶ 27. IV contends, in its Reply, that the full phrase “control link adapted to connect the video controller to the second controller to provide individualized variable control of each of the three white-light sources” in claim 15 means “an electronic connection through which individualized variable control of each of the three white-light sources is provided, where the electronic connection connects the video controller to the second controller.” PO Reply 3; *see* Ex. 2019 ¶ 16. Mr. Smith-Gillespie interprets the “control link” phrase in claim 16 similarly. Ex. 2019 ¶ 16. IV further argues in its Reply that

[o]ne of ordinary skill in the art would understand that the “variable control” implemented via the “control link” is a direct result of the connection between the “video controller” and the “second controller” and that the “variable control” occurs as a result of information in a video signal that is received by the video controller.

PO Reply 5; *see* Ex. 2019 ¶ 24.

We disagree with IV’s reading of the claim. The Specification of the ’334 patent has only one sentence regarding a control link: “[a] control link 124 is provided between controllers 122 and 130, and this link is used in some embodiments for some limited variable control of light output from each of the three light sources individually.” *See* Ex. 1001, col. 3, ll. 57–60. Thus, as described in the Specification, the control link connects the two controllers, and is “used” for controlling the light output from the three light sources. The Specification provides no detail as to how the control link is “used” or how “variable control” or “individualized variable control” of light sources is accomplished. Further, we do not see anything in the claims

or Specification requiring the control to be the “direct result” of the connection, or that the control occurs as a result of information in a “video signal” received by the video controller, as IV suggests. Applying the broadest reasonable interpretation in light of the Specification, we interpret the full phrase “control link adapted to connect the video controller to the second controller to provide individualized variable control of each of the three white-light sources” in claim 15 to mean a connection between the video controller and second controller through which individualized variable control over each of the three white-light sources is provided, and interpret “control link adapted to connect the video controller to the second controller to provide variable control of the source” in claim 16 to mean a connection between the video controller and second controller through which variable control over the source is provided.

*3. Claim 16: Responsiveness to the Ground of Unpatentability*

The parties dispute whether proposed substitute claim 16 enlarges the scope of the claims of the ’334 patent in violation of 37 C.F.R.

§ 42.121(a)(2)(ii). *See* Mot. to Amend 2–8; Pet. Opp. 1–6; PO Reply 1.

We need not reach this issue, however, because claim 16 violates 37 C.F.R.

§ 42.121(a)(2)(i), which specifies that a motion to amend may be denied where “[t]he amendment does not respond to a ground of unpatentability involved in the trial.” A “proposed substitute claim is not responsive to an alleged ground of unpatentability of a challenged claim if it does not either include or narrow each feature of the challenged claim being replaced.” *Idle Free* at 5; *see Toyota Motor Corp. v. American Vehicular Sciences LLC*, IPR2013-00419, slip op. at 3 (PTAB Mar. 7, 2014) (Paper 32) (“Generally,

[37 C.F.R. § 42.121(a)(2)(i)] means the proposed substitute claim should not eliminate any feature or element of the original patent claim which it is intended to replace. If there is a special circumstance to justify deviation from that general rule, the motion should provide adequate and persuasive explanation.”).

Proposed substitute claim 16, which would replace claim 12, removes the limitation from claim 12 that “the splitter divides the beam of white light into three separate beams of colored light, one red, one green, and one blue.” IV does not explain in its papers why the splitter limitation of original claim 12 is removed in claim 16, and could give no reason at the hearing as to why claim 16 is a proposed substitute for claim 12 rather than claim 11 (which does not include the particular splitter limitation of claim 12). *See* Tr. 48:23–49:1. Indeed, the removed limitation appears to have nothing to do with the “second controller” and “control link” limitations added to claim 16. Thus, it is unclear how IV is responding to the ground of unpatentability in this *inter partes* review for claim 12 (i.e., unpatentability over Takanashi and Lee under 35 U.S.C. § 103(a)) by removing the splitter limitation and adding the “second controller” and “control link” limitations. Without a reasonable explanation as to why the limitation recited in original claim 12 is eliminated, IV has not demonstrated that its proposed amendment is responsive to a ground of unpatentability involved in the trial. Therefore, with respect to proposed substitute claim 16, IV’s Motion to Amend does not comply with 37 C.F.R. § 42.121(a)(2)(i), and is denied on that basis.

*4. Claims 15 and 16: Patentability Over the Prior Art*

We first note that IV's Motion to Amend does not account sufficiently for the basic knowledge and skill set possessed by a person of ordinary skill in the art. IV asserts that proposed substitute claims 15 and 16 are "patentably distinct over both the prior art of record and the prior art known to [IV]," relying on the testimony of Mr. Smith-Gillespie. Mot. to Amend. 12, 15 (citing Ex. 2008). In its Motion, however, IV addresses only the two references involved in this *inter partes* review: Takanashi and Lee. *Id.* at 11–15. IV does not address, in any meaningful way, the level of ordinary skill in the art and what was previously known, or at least within the ordinary creativity and skill set of a person of ordinary skill in the art, regarding the added "controller" and "control link" in general. At least some explanation should have been provided as to why a skilled artisan, applying his or her own knowledge and creativity, would not have found the proposed substitute claims obvious. IV has failed to demonstrate the patentability of the proposed substitute claims on that basis as well.

Again, though, even if IV's arguments regarding patentability in its Reply are considered, we are not persuaded that IV has met its burden to show that proposed substitute claims 15 and 16 would have been nonobvious over the prior art. Xilinx, in opposing IV's motion, cites an additional prior art reference, U.S. Patent No. 5,136,397, issued Aug. 4, 1992 (Ex. 1010) ("Miyashita"). Pet. Opp. 8. Xilinx asserts that claims 15 and 16 are unpatentable over Takanashi, Lee, and Miyashita. *Id.* at 8–13. Xilinx argues that Lee and Miyashita teach all of the added limitations in claims 15 and 16, and that a person of ordinary skill in the art would have had reason to modify the Takanashi projector system to include the added limitations.

*Id.* Xilinx’s arguments are supported by the testimony of Dr. Buckman.  
See Ex. 1011 ¶¶ 28–34.

*a. Miyashita*

Miyashita is directed to a “liquid crystal video projection system” comprising, *inter alia*, a liquid crystal panel, heat sensor, variable-speed cooling fan, and control module. Ex. 1010, col. 2, ll. 26–36. Figure 3 of Miyashita is reproduced below.

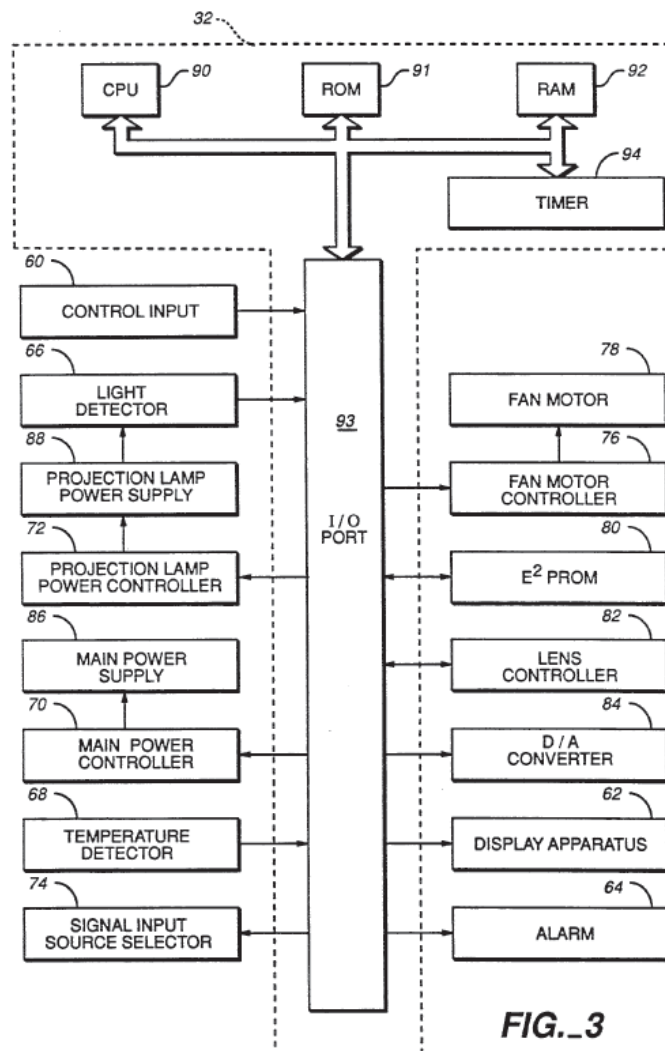


Figure 3 depicts the components of liquid crystal video projector 30, including control unit 32 and other devices that communicate with each other via input/output (I/O) port 93, such as projection lamp power controller 72 and fan motor controller 76. *Id.* at col. 5, ll. 21–41. As shown in Figure 2, control unit 32 includes picture controller 42. *Id.* at col. 4, l. 61–col. 5, l. 1.

*b. Analysis*

We agree with Xilinx regarding the teachings of Takanashi, Lee, and Miyashita, and agree that a person of ordinary skill in the art would have had reason to combine them in the manner proposed by Xilinx and Dr. Buckman. *See* Pet. Opp. 10–13; Ex. 1011 ¶¶ 28–34. Specifically, Lee teaches the use of three individual light sources and a “second controller” to provide individualized variable control of the light sources. *See* Pet. Opp. 11–13; Ex. 1003, col. 3, ll. 14–19 (“three unicolor light sources . . . are connected to a lamp voltage controlling circuit 18 so as to change the light intensity emitted from a respective light source”); col. 4, ll. 14–20; Ex. 1013 at 157:22–158:5 (testimony from Mr. Smith-Gillespie acknowledging that Lee “provide[s] individualized variable control of each of the individual light sources”). Miyashita teaches the use of a single light source, a “second controller” (projection lamp power controller 72) to provide variable control of the light source, and a “control link adapted to connect the video controller to the second controller” to control the light source (I/O port 93 link permitting control unit 32 to communicate with projection lamp power controller 72). *See* Pet. Opp. 11–13; Ex. 1010, col. 5, ll. 21–41.

IV makes two arguments. First, IV contends that, with respect to the claimed “second controller,” Dr. Buckman’s annotations of Figure 3 of Miyashita are different from those he provided in related Case IPR2013-00029. PO Reply 3. The related proceeding, however, involved different claim language. For instance, the “second controller” in the proposed substitute claims in that case was adapted to control individual light sources and a “fan,” unlike the proposed substitute claims in this proceeding, which just require the light source(s). *Compare* IPR2013-00029 Final Dec. 39 *with* Mot. to Amend 1–2. As explained above, we agree with Xilinx that projection lamp power controller 72 in Miyashita constitutes a “second controller.”

Second, IV argues that Miyashita does not teach the claimed “control link” because control in the Miyashita system is not the direct result of the connection between devices, and because control unit 32 is not a “video controller.” PO Reply 3–5. We do not agree with IV’s reading of the claims and instead interpret the full “control link” phrases to mean a connection between the video controller and second controller through which individualized variable control over each of the three white-light sources is provided (for claim 15), and a connection between the video controller and second controller through which variable control over the source is provided (for claim 16). Miyashita teaches that I/O port 93 is a connection between control unit 32 and projection lamp power controller 72 for a single light source, and Lee teaches that more than one light source may be controlled. *See* Ex. 1010, col. 5, ll. 21–41; Ex. 1003, col. 3, ll. 14–19. Further, Miyashita’s control unit 32 includes picture controller 42, which “provides control to set the level of the picture attributes of color, hue, brightness,

contrast, and sharpness (peaking),” and is a “video controller” under our interpretation. *See* Ex. 1010, col. 4, ll. 61–64. Regardless, the use of a “video controller” would have been obvious based on Lee, as explained above. *See supra* Section II.B.3.c. IV’s arguments regarding the claimed “control link,” therefore, are not persuasive.

Based on the foregoing discussion, IV has not met its burden to demonstrate that claims 15 and 16 would have been nonobvious over Takanashi, Lee, and Miyashita. Because we agree with Xilinx regarding the teachings of Miyashita, and conclude that IV has not met its burden to demonstrate patentability over the reference in combination with the other prior art involved in this *inter partes* review, we need not address Xilinx’s other arguments in its Opposition. *See* Pet. Opp. 3–6.

#### *D. IV’s Motion for Observation*

IV’s Motion for Observation pertains to Dr. Buckman’s testimony on cross-examination. We have considered IV’s observations and Xilinx’s responses. *See* Obs. 2–6; Obs. Resp. 1–4.

#### *E. IV’s Motion to Exclude*

IV moves to exclude Dr. Buckman’s initial declaration filed with Xilinx’s Petition (Exhibit 1005), Dr. Buckman’s declaration directed to IV’s proposed substitute claims (Exhibit 1011), and Dr. Buckman’s reply declaration directed to the challenged claims (Exhibit 1012). Mot. to Exclude 1. IV identifies where in the record it objected to Exhibits 1005, 1011, and 1012, and Xilinx identifies a supplemental declaration from Dr. Buckman (Exhibit 1008) submitted as supplemental evidence in

response to IV's initial objection.<sup>8</sup> See Mot. to Exclude 1–2; Exclude Opp. 2–3. As the moving party, IV bears the burden of proof to establish that it is entitled to the relief requested—namely, that Dr. Buckman's testimony is inadmissible under the Federal Rules of Evidence. See 37 C.F.R. §§ 42.20(c), 42.62(a).

Federal Rule of Evidence 702 provides:

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

(a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;

(b) the testimony is based on sufficient facts or data;

(c) the testimony is the product of reliable principles and methods; and

(d) the expert has reliably applied the principles and methods to the facts of the case.

IV makes two arguments. First, IV contends that Dr. Buckman is not qualified to offer expert testimony in this proceeding because, although he has experience in electrical engineering and optics in general, he does not have specialized experience with video projection systems. Mot. to Exclude 2–4 (citing *Shreve v. Sears, Roebuck & Co.*, 166 F. Supp. 2d 378, 393 (D. Md. 2001)). IV argues, for instance, that Dr. Buckman has not built, taught, or written about video projection systems in particular. *Id.* at 3.

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<sup>8</sup> The parties are reminded that objections to evidence, and supplemental evidence in response to an objection, are “served” on the opposing party, not “filed,” under 37 C.F.R. §§ 42.64(b) and 42.64(c). Under the circumstances, because the documents would have been filed as exhibits with the parties' motion to exclude papers regardless, we will maintain the documents in the record rather than expunging them.

We are not persuaded that Dr. Buckman is unqualified to offer testimony in this proceeding. Dr. Buckman states that he has over forty years of experience in the field of optics, and was a professor of electrical engineering for thirty-five years. Ex. 1008 ¶ 3. He taught optics courses that addressed many of the standard optical components described in the '334 patent and cited prior art references (e.g., spatial light modulators, color filters, polarizers, prisms, lenses), designed and built systems using these components, and authored a textbook entitled "Guided-Wave Photonics." *Id.* ¶¶ 5–8. Dr. Buckman testifies that he has significant experience with spatial light modulators and electrical devices that control spatial light modulators. *Id.* ¶¶ 11–12. IV does not explain sufficiently why video projection is so specialized a field that an individual with such experience in the field of optics would not be qualified to opine on the issues in this proceeding.

Second, IV argues that Dr. Buckman's opinions are unreliable because he changed his opinions about (1) the alleged "second controller" in Miyashita, (2) the alleged "control link" in Lee, and (3) the alleged "video controller" in Lee. Mot. to Exclude 5–13. IV points to testimony from Dr. Buckman in this proceeding and in related Case IPR2013-00029 involving claims of the '545 patent and the proposed substitute claims in that proceeding. *Id.* IV asserts that Dr. Buckman's declarations should be excluded in their entirety because Dr. Buckman's opinions are unreliable. *Id.*

With respect to the "second controller" and "control link" limitations of the proposed substitute claims, IV's arguments are not persuasive, as the proposed substitute claims at issue in this proceeding are different from

those at issue in Case IPR2013-00029. For example, proposed substitute claim 16 in this proceeding recites a “second controller adapted to control the source,” and a “control link adapted to connect the video controller to the second controller to provide variable control of the source.” Mot. to Amend 1–2. Proposed substitute claims 4 and 5 in Case IPR2013-00029, by contrast, recited a “second controller adapted to control the individual light sources *and the fan*,” and a “control link adapted to connect the video controller to the second controller to provide *individualized variable control of each of the individual light sources*.” IPR2013-00029 Final Dec. 39 (emphasis added). Because the claim language at issue is different, we do not agree that Dr. Buckman’s testimony necessarily is contradictory. Further, as to the “control link” limitations in this proceeding, we agree with Xilinx that the wires between Lee’s lamp voltage controlling circuit 18 and white light sources 26 facilitate individualized variable control over the light sources, regardless of what they are called (i.e., a “control link” or “control lines”). See Exclude Opp. at 13–14. Thus, we are not persuaded that Dr. Buckman’s testimony is unreliable based on his stated opinions regarding the “second controller” and “control link” in each proceeding.

With respect to the “video controller” limitation of the challenged claims, as explained above, we agree with IV that Dr. Buckman’s change in opinion regarding the alleged “video controller” in Lee impacts his credibility and the weight to be given his testimony on that issue. See *supra* Section II.B.3.c. We are not persuaded, however, that the change makes the entirety of his testimony unreliable and inadmissible. IV does not explain sufficiently how Dr. Buckman’s admitted mistake regarding the alleged “video controller” in Lee impacts the remainder of his testimony dealing

with other prior art references and other aspects of Lee. Indeed, as Xilinx points out, courts have recognized that an expert's mistake or changed opinion goes to the expert's credibility, not the admissibility of the entire testimony. *See* Exclude Opp. 15; *Deputy v. Lehman Bros., Inc.*, 345 F.3d 494, 506–507 (7th Cir. 2003). Challenges to a witness's credibility and the weight to be accorded his or her testimony are not appropriate in a motion to exclude. *See* Rules of Practice for Trials Before the Patent Trial and Appeal Board and Judicial Review of Patent Trial and Appeal Board Decisions; Final Rule, 77 Fed. Reg. 48,612, 48,633 (Aug. 14, 2012) (“Issues relating to credibility and the weight of the evidence may be raised in responses and replies. To the extent a party seeks to exclude the evidence in dispute, a party is to raise the issue in a motion to exclude.”); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,765, 48,767 (Aug. 14, 2012). The Board is capable of assessing a witness's testimony and the bases for that testimony, or lack thereof, when weighing all of the evidence in a proceeding.

IV has not met its burden to demonstrate that Dr. Buckman's declarations (Exhibits 1005, 1011, and 1012) are inadmissible.

### III. ORDER

Xilinx has demonstrated, by a preponderance of the evidence, that claims 1–6 and 11–14 are unpatentable over Takanashi and Lee under 35 U.S.C. § 103(a). Claims 7–10 are not subject to the instant *inter partes* review.

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–6 and 11–14 of the '334 patent have been shown to be unpatentable;

FURTHER ORDERED that IV's Motion to Amend is *denied*;  
FURTHER ORDERED that IV's Motion to Exclude is *denied*; and  
FURTHER ORDERED that IV's motion to file a substitute Exhibit  
2010 (Paper 33) is *granted*, and the copy of Exhibit 2010 filed on August 27,  
2013, is expunged from the record of the instant proceeding.

This is a final 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.

IPR2013-00112  
Patent 5,779,334

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