

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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LG ELECTRONICS, INC.,  
Petitioner,

v.

ATI TECHNOLOGIES ULC,  
Patent Owner

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Case IPR2015-00326  
Patent 6,897,871 B1

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Before JONI Y. CHANG, BRIAN J. McNAMARA, and  
JAMES B. ARPIN, Administrative Patent Judges.

McNAMARA, *Administrative Patent Judge.*

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

**LG Ex. 1007**  
**LG v. ATI**

## BACKGROUND

On July 10, 2015, we instituted an *inter partes* review of claims 1–3, 5, 6, 8–11, 13, 15, 17, 18, and 20 (“the challenged claims”) of U.S. Patent No. 6,897,871 B1 (Ex. 1001, “the ’871 Patent”). Paper 13 (“Dec. to Inst.”). ATI Technologies ULC (“Patent Owner”) filed a redacted and an un-redacted Patent Owner Response and a Motion to Seal. Papers 21, 20, and 19, respectively. LG Electronics, Inc. (“Petitioner”) filed an Opposition to Patent Owner’s Motion to Seal (Paper 25), Petitioner’s own Motion to Seal (Paper 27), an un-redacted Reply, and a redacted Reply (Papers 28 and 29, respectively).<sup>1</sup> We authorized Patent Owner to file a Sur-Reply. Paper 32. Patent Owner filed duplicate Sur-Replies on February 9, 2016. Papers 36 and 37. Petitioner also filed a Motion to Exclude (Paper 41), which Patent Owner opposed (Paper 42), to which Petitioner replied (Paper 44). An oral hearing was conducted on April 6, 2016, and a transcript entered into the record. Paper 48 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). We base our decision on the preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). Having reviewed the arguments of the parties and the supporting evidence, we conclude that challenged claims 1–3, 5, 6, 8–11, 13, 15, 17, and 18 are unpatentable. Petitioner has not demonstrated that claim 20 is unpatentable.

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<sup>1</sup> Unless otherwise noted, all references herein are to Petitioner’s un-redacted Reply, Paper 28 (“Reply”).

## BACKGROUND AND RELATED PROCEEDINGS

In this proceeding, we instituted *inter partes* review on the following grounds:

Claims 1, 2, 5, 8, 10–11, 13, and 15 as anticipated under 35 U.S.C. § 102(e) by Lindholm;

Claims 3 and 6 as obvious under 35 U.S.C. § 103 over the combination of Lindholm and Open GL;

Claims 9, 17, and 18 as obvious under 35 U.S.C. § 103 over the combination of Lindholm and Kizhepat;

Claim 20 as obvious under 35 U.S.C. § 103 over the combination of Lindholm and Kurihara;

Claim 15 as obvious under 35 U.S.C. § 103 over Rich; and

Claim 20 as obvious under 35 U.S.C. § 103 over the combination of Rich and Kurihara.

During the oral hearing, Patent Owner conceded that, if it failed to antedate Lindholm, claims 1, 2, 5, 8, 10–11, 13, and 15 are unpatentable as anticipated by Lindholm, claims 3 and 6 are unpatentable as obvious under 35 U.S.C. § 103 over the combination of Lindholm and Open GL, and claims 9, 17, and 18 are unpatentable as obvious under 35 U.S.C. § 103 over the combination of Lindholm and Kizhepat. Ex. 2126, slide 2; Tr. 26 (“[T]he only basis for patentability with respect to grounds 1 through 3 is the antedating of Lindholm.”).

All of the members of the panel in this proceeding participated in the oral hearing in related case IPR2015-00325, during which Patent Owner’s arguments concerning antedating of Lindholm were heard. Tr. 5. Patent Owner relies the same evidence and substantially the same arguments in the present review and in IPR2015-00325 in support of its efforts to antedate Lindholm. *Compare, e.g.,*

IPR2015-00326, Paper 20, at v–x, 20–32 *with* IPR2015-00325, Paper 21, at v–x, 15–29. In the Final Written Decision in IPR2015-00325, the panel determined that Patent Owner had not antedated Lindholm. *LG Elecs., Inc. v. ATI Techs. ULC*, Case IPR2015-00325, slip op. at 12–53 (PTAB April 14, 2016) (Paper 62). In view of the determination that Patent Owner has not antedated Lindholm, and in view of Patent Owner’s concession, we conclude that claims 1, 2, 5, 8, 10–11, 13, and 15 are unpatentable as anticipated by Lindholm, claims 3 and 6 are unpatentable as obvious under 35 U.S.C. § 103 over the combination of Lindholm and Open GL, and claims 9, 17, and 18 are unpatentable as obvious under 35 U.S.C. § 103 over the combination of Lindholm and Kizhepat.

The only matters remaining before this panel are whether claim 15 is obvious over Rich and whether claim 20 is obvious over the combination of Rich and Kurihara and the combination of Lindholm and Kurihara.

#### THE ’871 PATENT

In computer graphics systems, a three-dimensional shape is represented by collection of simple polygons called “primitives.” Ex. 1001, col. 1, ll. 11–12. Primitives are formed by the interconnection of individual pixels. *Id.* at col. 1, ll. 15–17. Color and texture are applied to the individual pixels that comprise the shape based on their location within the primitive and the primitive’s orientation relative to the generated shape. *Id.* at col. 1, ll. 17–19.

A three-dimensional shape represented by a wireframe collection of primitives is transformed into colored images by two graphics-processing operations: (i) vertex operations and (ii) pixel operations. Prelim. Resp. 2 (citing Ex. 1001, col. 1, ll. 11–59). To orient the wireframe model as desired, matrix transformations applied to vertices  $V_x$ ,  $V_y$ ,  $V_z$  of the primitives generate new vertices  $V_x'$ ,  $V_y'$ ,  $V_z'$ , which then are translated into pixels to generate a rendered

object that can be displayed as a two-dimensional image. *Id.* at 3 (citing Ex. 1001, col. 1, ll. 36–49). Pixel operations performed on each pixel of the rendered object determine the pixel’s color and appearance. *Id.* (citing Ex. 1001, col. 1, ll. 49–53).

Conventional graphics processors include “shaders” that specify how and with what corresponding attributes a final image is generated on a screen or other device. Ex. 1001, col. 1, ll. 24–27. Conventional graphics processors require both a vertex shader and a pixel shader to render an object. *Id.* at col. 1, ll. 61–62. A vertex shader accepts as inputs data representing the vertices  $V_x$ ,  $V_y$ ,  $V_z$ , applies the matrix transformation, and provides angularly-oriented vertices  $V_x'$ ,  $V_y'$ ,  $V_z'$ . A pixel shader operating at the pixel level provides the color value associated with each pixel of the rendered object. *Id.* at col. 1, ll. 50–54.

The '871 Patent employs a “unified shader” capable of performing both vertex operations and pixel operations. *Id.* at col. 2, ll. 37–39. A multiplexer receives vertex data at a first input, and pixel parameter data and attribute data from a rasterization engine at a second input. *Id.* at col. 3, ll. 60–65. In response to a control signal, an arbiter circuit selects one of a plurality of inputs for processing and a shader coupled to the arbiter performs vertex operations or pixel operations based on the selected one of the inputs. *Id.* at col. 2, ll. 40–49. A control signal generated by the arbiter determines which of the two multiplexer inputs is provided to the unified shader. *Id.* at col 3, l. 65–col. 4, l. 1. According to an arbitration scheme implemented in the arbiter, vertex data at the first input is transmitted to the unified shader if there are sufficient resources available in the unified shader to operate on the vertex data; otherwise interpolated pixel data on the second multiplexer input is passed to the unified shader. *Id.* at col. 4, ll. 2–8.

The unified shader includes a general purpose register for storing the plurality of selected inputs, a sequencer for storing logical and arithmetic

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