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UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

VDPP LLC,

Plaintiff,

v.

TTE TECHNOLOGY, INC.
d/b/a TCL USA,

Defendant.

Case No. 5:19-CV-2019

COMPLAINT FOR PATENT INFRINGMENT

JURY TRIAL DEMANDED

Jurisdiction and Venue

1. This action arises under the patent laws of the United States, 35 U.S.C. §§ 101 et seq. This Court has subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338(a).

2. This Court may exercise personal jurisdiction over TCL. TCL conducts continuous and systematic business in California and in this District. TCL's principal place of business is located in this District. These patent-infringement claims arise directly from TCL's continuous and systematic activity in this District. In short, this Court's exercise of jurisdiction over TCL would be consistent with the California long-arm statute and traditional notions of fair play and substantial justice. Venue is proper in this District pursuant to 28 U.S.C. § 1400(b).

Parties

3. Plaintiff VDPP LLC ("VDPP") is a limited liability company organized under the laws of Oregon with a principal place of business located in Corvallis, Oregon.

4. Defendant TTE Technology, Inc. d/b/a TCL USA ("TCL") is a corporation organized under the laws of Delaware with a principal place of business located in Corona, California.

Count 1 – Infringement of U.S. Patent No. 10,021,380

5. VDPP is the exclusive owner of United States Patent No. 10,021,380 (the "'380 patent"), which is attached hereto as "Exhibit 1."

6. The '380 patent is valid and enforceable.

7. TCL has been and is directly infringing at least one of the 30 claims of the '380 patent. TCL has made and sold and is making and selling the televisions, including the "Class 3-Series," "Class 4-Series," "Class 5-Series," and "Class 6-Series," which embody claims of the '380 patent. Without limiting the claims that will be asserted or the products that will be accused of infringement in this action,

TCL infringes claim 6 of the '380 patent by making and selling the Class 6-Series 55R617 (the "6-Series"), by performing TCL's "Action Smoothing," which decreases "judder" or "stutter."

a. The apparatus of claim 6 comprises "a storage adapted to: store a sequence of image frames[.]" (Ex. 1 at 113:28-30.) The 6-Series is an apparatus with storage to store a sequence of image frames.

b. The claim 6 apparatus comprises "a processor communicably coupled to the storage and adapted to: obtain from said storage a first image frame associated with a first chronological position in the sequence image frames and a second image frame associated with a second chronological position in the sequence of image frames[.]" (Ex. 1 at 113:31-37.) The 6-Series has a processor and a storage, both of which are connected. The 6-Series receives a video stream that consists of a series of still image frames in a chronological sequence. The 6-Series' processor obtains the still images from the storage, each of which are associated with the chronological order.

c. The processor of claim 6 is further adapted to "expand the first image frame to generate a modified first image frame, wherein the modified first image frame is different from the first image frame; [and] expand the second image frame to generate a modified second image frame, wherein the modified second image frame is different from the second image frame[.]" (Ex. 1 at 133:38-44.) The 6-Series is capable of 4K UHD picture quality, with a native resolution of 4K. https://www.tclusa.com/products/home-theater/6-series. The 6-Series' processor is adapted to upscale lower resolutions to match the 6-Series native resolution.

d. The claim 6 processor is adapted to "combine the modified first image frame and the modified second image frame to generate a modified combined image frame, the modified combined image frame having first and second opposing sides defining a first dimension and third and fourth

opposing sides defining a second dimension[.]" (Ex. 1 at 113:45-50.) The 6-Series performs a method of motion interpolation by creating an artificial image frame, i.e. an image frame not provided in the video stream, by combining the first and second modified image frames. This modified combined image frame represents the 6-Series' approximation of what an intermediate frame—between the first and second modified image frames—would look like. This feature can be enabled under the "Advanced Picture Settings" menu of the 6-Series.

e. The claim 6 apparatus' processor is adapted to "display the modified combined image frame." (Ex. 1 at 113:51.) The 6-Series displays the modified combined image frame after displaying the first modified image frame and before displaying the second modified image frame.

Count 2 – Infringement of U.S. Patent No. 9,699,444

8. VDPP is the exclusive owner of United States Patent No. 9,699,444 (the "'444 patent"), which is attached hereto as "Exhibit 2."

9. The '444 patent is valid and enforceable.

10. TCL has been and is directly infringing at least one of the 27 claims of the '444 patent. TCL has made and sold and is making and selling the 6-Series televisions, which embody claims of the '444 patent. Without limiting the claims that will be asserted or the products that will be accused of infringement in this action, TCL infringes claim 1 of the '444 patent by making and selling the 6-Series, which is designed to perform local dimming using TCL's "Contrast Control Zone" technology with "up to 160 zones." https://www.tclusa.com/products/home-theater/6-series.

a. Claim 1 of the '444 patent claims an "apparatus comprising: a storage adapted to: store one or more image fames[.]" (Ex. 2 at 47:40-42.) The 6-Series is an apparatus with storage to store a sequence of image frames.

b. The Claim 1 apparatus comprises "a processor adapted to: obtain a first image frame from a first video stream; [and] expand the first image frame to generate a modified image frame, wherein the modified image frame is different from the first image frame[.]" (Ex. 2 at 47:43-47.) The 6-Series is capable of 4K UHD picture quality, with a native resolution of 4K. https://www.tclusa.com/products/home-theater/6-series. The 6-Series' processor is adapted to upscale lower resolutions to match the 6-Series native resolution.

c. The processor of claim 1 is adapted to "generate a bridge frame, wherein the bridge frame is a non-solid color, wherein the bridge frame is different from the first image frame and different from the modified image frame[.]" (Ex. 2 at 47:48-51.) The 6-Series is a direct-backlight LED LCD TV, which means that the 6-Series displays video using two separate layers. The front layer is liquid crystal layer (the "LCM Layer") containing millions of pixels, each of which is split into subpixels of the primary colors: red, green, and blue. The back layer is a backlight unit of LED lights (the "BLU") that illuminates the LCM Layer. In order to achieve deeper black levels and higher contrast levels, the 6-Series will dynamically turn off localized areas of the BLU—areas where the image should be black, resulting in a bridge frame that is non-solid, i.e., parts of the frame are black, parts of the frame are white, and parts of the frame are a gradient thereof. "TCL's Contrast Control Zone technology individually optimizes the image across up to 160 zones to yield striking contrast between light and dark areas." https://www.tclusa.com/products/home-theater/6-series.

d. In claim 1, the processor is adapted to "blend the modified image frame with the bridge frame to generate a blended modified image frame; and display the blended modified image frame." (Ex. 2 at 47:52-54.) The 6-Series blends the bridge frame (the locally-dimmed BLU image) with

the modified image frame (the upscaled RGB image of the LCM) to create and display the blended modified image frame.

11. Further, TCL's Class 3-Series, Class 4-Series, Class 5-Series, and Class 6-Series, infringe claim 27 of the '444 patent by performing "black frame insertion" in a manner that infringes the '444 patent. Without limiting the claims that will be asserted or the products that will be accused of infringement in this action, TCL's 6-Series infringes claim 27 as follows:

a. Claim 27, which is dependent on claim 26, claims an "apparatus comprising: a storage adapted to: store one or more image frames[.]" (Ex. 2 at 50:37-39.) The 6-Series is an apparatus with storage to store a sequence of image frames.

b. The claim 27 apparatus comprises "a processor adapted to: obtain a first image from a first video stream [.]" (Ex. 2 at 50:40-41.) The 6-Series is equipped with a graphics processing unit adapted to obtain images that together make a video stream.

c. The claim 27 processor is adapted to "generate a modified image frame by . . . expanding the first image frame . . . wherein the modified image frame is different from the first image frame[.]" (Ex. 2 at 50:42-49.) The 6-Series is capable of 4K UHD picture quality, with a native resolution of 4K. https://www.tclusa.com/products/home-theater/6-series. The 6-Series' processor is adapted to upscale lower resolutions to match the 6-Series native resolution.

d. The claim 27 processor is further adapted to "generate a bridge frame, wherein the bridge frame is a solid color, wherein the bridge frame is different from the first image frame and different from the modified image frame[.]" (Ex. 2 at 50:50-53.) The bridge frame is black. (*Id.* at 50:56-57.) All televisions display video as a series of still images. These images change quickly enough to produce the illusion of motion—much like a flip book.

Because televisions are unable to produce truly moving images, the human eye perceives the "moving" object as blurred. To reduce this perceived motion blur, the 6-Series practices the invention of claim 27 by generating a solid black bridge frame and inserting the bridge frame between the modified image frames.

e. The claim 27 apparatus then will "display the modified image frame; and display the bridge frame." (Ex. 2 at 50:54-55.) The 6-Series displays the modified image frame, and then displays the solid black bridge frame.

Count 3 – Infringement of U.S. Patent No. 9,948,922

12. VDPP is the exclusive owner of United States Patent No. 9,948,922 (the "'922 patent"), which is attached hereto as "Exhibit 3."

13. The '922 patent is valid and enforceable.

14. TCL has been and is directly infringing at least one of the 12 claims of the '922 patent. TCL has made and sold and is making and selling the Class 3-Series, Class 4-Series, Class 5-Series, and Class 6-Series televisions, which embody claims of the '922 patent. Without limiting the claims that will be asserted or the products that will be accused of infringement in this action, TCL infringes claim 2 of the '922 patent by making and selling the 6-Series, which is designed to perform "black frame insertion" in a manner that infringes the '922 patent.

a. Claim 2 of the '922 patent, which is dependent on claim 1, claims an "apparatus comprising: a storage adapted to: store one or more image fames[.]" (Ex. 3 at 113:27-29.) The 6-Series is an apparatus with storage to store a sequence of image frames.

b. The claim 2 apparatus includes "a processor adapted to: obtain a first image frame and a second image frame from a first video stream[.]" (Ex. 3 at 113:30-32.) The 6-Series has a processor adapted to acquire a sequence of images that make a video stream.

c. The processor of claim 2 is adapted to "generate a first modified image frame by expanding the first image frame, wherein the first modified image frame is different from the first image frame; [and] generate a second modified image frame by expanding the second image frame, wherein the second modified image frame is different from the second image frame[.]" (Ex. 3 at 113:33-39.) The 6-Series is capable of 4K UHD picture quality, with a native resolution of 4K. https://www.tclusa.com/products/home-theater/6-series. The 6-Series' processor is adapted to upscale lower resolutions to match the 6-Series native resolution.

d. The claim 2 apparatus' processor is adapted to "generate a bridge frame, wherein the bridge frame is a solid color, wherein the bridge frame is different from the first image frame and different from the second image frame[.]" (Ex. 3 at 113:40-43.) "[T]he bridge frame is black." (*Id.* at 113:47-48.) All televisions display video as a series of still images. These images change quickly enough to produce the illusion of motion—much like a flip book. Because televisions are unable to produce truly moving images, the human eye perceives the "moving" object as blurred. To reduce this perceived motion blur, the 6-Series practices the invention of claim 2 by generating a solid black bridge frame and inserting the bridge frame between the modified image frames.

e. The processor of claim 2 is adapted to "display the first modified image frame; display the bridge frame; and display the second modified image frame." (Ex. 3 at 113:44-46.) The 6-Series displays the first modified image frame, then displays the solid black bridge frame, then displays the second modified image frame.

Count 4 – Infringement of U.S. Patent No. 9,426,452

15. VDPP is the exclusive owner of United States Patent No. 9,426,452

(the "'452 patent"), which is attached hereto as "Exhibit 4."

16. The '452 patent is valid and enforceable.

17. TCL has been and is directly infringing at least one of the 4 claims of the '452 patent. TCL has made and sold and is making and selling more than 50 models of mobile phones and tablets under the "Alcatel" brand that infringe claims of the '452 patent. Without limiting the claims that will be asserted or the products that will be accused of infringement in this action, TCL infringes claim 2 of the '452 patent by making and selling the Alcatel 7 mobile phone.

a. Claim 2 of the '452 patent claims an "apparatus comprising: a storage adapted to: store one or more image fames[.]" (Ex. 4 at 46:42-44.) The Alcatel 7 is an apparatus with storage to store a sequence of image frames.

b. The claim 2 apparatus includes "a processor adapted to: obtain a first image from a first video stream; obtain a second image from a second video stream, wherein the first image is different from the second image; [and] stitch together the first image and the second image to generate a stitched image frame[.]" (Ex. 4 at 46:45-51.) The Alcatel 7 includes a MT6736TA Octa-Core processor, https://us.alcatelmobile.com/alcatel-7/, which facilitates the execution of the Alcatel 7's video chat feature through, for example, Google Hangouts. The processor obtains image frames from at least two separate video streams: one for each participant in the video chat. The processor then creates a stitched image frame by combining the two video streams within the same image frame.

c. The processor of claim 2 is adapted to "generate a first modified image frame by removing a first portion of the stitched image frame; generate a second modified image frame by removing a second portion of the stitched image frame; [and] generate a third modified image frame by removing a third portion of the stitched image frame; wherein the

first modified image frame, the second modified image frame, and the third modified image frame are different from each other[.]" (Ex. 4 at 46:52-60.) The processor creates three modified image frames from the stitched image frame by removing two of the primary colors (red, green, and blue) in each modified image frame, resulting in a modified image frame representing only the red components, a second modified image frame representing only the green components, and a third modified image frame representing only the blue components.

d. The claim 2 apparatus' processor is adapted to "identify a bridge frame [and] blend the first modified image frame with the bridge frame to generate a first blended frame; blend the second modified image frame with the bridge frame to generate a second blended frame; blend the third modified image frame with the bridge frame to generate a third blended frame [and] overlay the first blended frame, the second blended frame, and the third blended frame to generate a combined frame[.]" (Ex. 4 at 46:61-47:3.) The Alcatel 7 has a 6" LCD display screen that consists of a liquid crystal layer (the "LCM Layer") containing millions of pixels, each of which is split into subpixels of the primary colors: red, green, and blue, and a backlight unit of LED lights (the "BLU") that illuminates the LCM Layer. This Backlight unit emits white light and is identified by the processor as the bridge frame. The modified image frames, when blended with the backlight frame show the respective red, green, or blue colors of the first image of the video chat. When those blended frames are overlayed, the video chat image is shown in its full range of colors.

e. Finally, the processor of claim 2 is adapted to "display the combined frame." (Ex. 4 at 47:4.) The Alcatel 7 displays the combined, full-color video chat image.

Count 5 – Infringement of U.S. Patent No. 9,942,487

18. VDPP is the exclusive owner of United States Patent No. 9,942,487 (the "'487 patent"), which is attached hereto as "Exhibit 5."

19. The '487 patent is valid and enforceable.

20. TCL has and is directly infringing at least one of the 7 claims of the '487 patent. TCL has made and sold and is making and selling televisions that infringe claims of the '487 patent. Without limiting the claims that will be asserted or the products that will be accused of infringement in this action, TCL infringes claim 2 of the '487 patent by making and selling the 6-Series, which performs "backlight scanning" to minimize the effects of perceived motion blur in a manner that infringes the '487 patent. To combat motion blur caused by image persistence, the 6-Series does not display an entire image at one given moment; rather, 6-Series displays only a first portion of the image, and then it will display only a second portion of the image.

a. Claim 2 of the '487 patent claims an "apparatus comprising: a storage configured to: store a compressed image frame and temporal redundancy information[.]" (Ex. 5 at 23:17-20.) The 6-Series has a processor and a storage, both of which are connected. The storage is configured to store compressed images and corresponding temporal redundancy information.

b. The Claim 2 apparatus comprises "a processor configured to: receive the compressed image frame and the temporal redundancy information; [and] decompress the image frame[.]" (Ex. 5 at 23:21-24.) The processor is "configured to: decompress the image frame based on the temporal redundancy information." (*Id.* at 24:12-15.) The 6-Series' processor is configured to receive the compressed image frames and, using the temporal redundancy information, decompress the image frames for display as video.

c. The processor of claim 2 is adapted to "generate a plurality of

bridge frames that are different from the image frame, wherein the plurality of bridge frames includes: a first bridge frame having a first width, the first bridge frame comprising a first white rectangle in an upper portion of the first bridge frame, the first white rectangle having the first width; and a second bridge frame having a second width, the second bridge frame comprising a dark rectangle in an upper portion of the second bridge frame, the dark rectangle having the second width[.]" (Ex. 5 at 23:25-35.) The 6-Series processor generates a series of bridge frames that act as templates for the display of each image frame. Each bridge frame includes a white portion that represents the visible portion of each image frame that will be displayed. The 6-Series generates a first bridge frame with a white rectangle in the upper portion of the image frame that extends the width of the image frame. The 6-Series will also generate a second bridge frame with a black rectangle, this rectangle occupying the same space as the white rectangle of the first bridge frame.

d. Having generated the bridge frames, the processor of claim 2 will then "blend the image frame and the plurality of bridge frames, generating a plurality of blended frames, wherein the plurality of blended frames include: a first blended frame that includes the first portion of the image frame in an upper portion of the first blended frame; and a second blended frame that includes the dark rectangle in an upper portion of the second blended frame[.]" (Ex. 5 at 24:1-9.) The 6-Series applies the generated bridge frames to each image frame, creating multiple blended frames. The 6-Series creates a blended frame with the upper portion of the image frame visible, and the 6-Series creates a second blended frame with the upper portion of the image frame black.

e. Finally, the processor of claim 2 is adapted to "display the plurality of blended frames consecutively within a video." (Ex. 5 at 24:10-

11.) The 6-Series displays the blended frames as a video, minimizing motion blur.

Count 6 – Infringement of U.S. Patent No. 9,781,408

21. VDPP is the exclusive owner of United States Patent No. 9,781,408 (the "'408 patent"), which is attached hereto as "Exhibit 6."

22. The '408 patent is valid and enforceable.

23. TCL has and is directly infringing at least one of the 24 claims of the '408 patent. TCL has made and sold and is making and selling televisions that infringe claims of the '408 patent. Without limiting the claims that will be asserted or the products that will be accused of infringement in this action, TCL infringes claim 2 of the '408 patent by making and selling the 6-Series, which performs "backlight scanning" to minimize the effects of perceived motion blur in a manner that infringes the '408 patent. To combat motion blur caused by image persistence, the 6-Series does not display an entire image at one given moment; rather, the 6-Series displays only a first portion of the image, and then it will display only a second portion of the image.

a. Claim 2 of the '487 patent, which is dependent on claim 1, claims an "apparatus comprising: a storage adapted to store one or more image frames[.]" (Ex. 6 at 113:2-3.) The 6-Series is an apparatus that stores video as a sequence of image frames.

b. The claim 2 apparatus comprises "a processor adapted to: obtain a first image frame from a first video stream [and] expand the first image frame to generate a modified image frame, wherein the modified image frame is different from the first image frame[.]" (Ex. 6 at 113:4-8.) The 6-Series is capable of 4K UHD picture quality, with a native resolution of 4K. https://www.tclusa.com/products/home-theater/6-series. The 6-Series' processor is adapted to upscale lower resolutions to match the 6-Series native resolution when the processor obtains image frames from a video stream.

c. The claim 2 processor is adapted to "generate a first altered image frame that includes first and second non-overlapping portions, wherein the first non-overlapping portion comprises a first portion of the modified image frame, wherein the first image frame does not include the second non-overlapping portion, wherein the modified image frame does not include the second non-overlapping portion[.]" (Ex. 6 at 113:9-16.) "[T]he second non-overlapping portion of the first altered frame is black." (*Id.* at 113:28-29.) The 6-Series generates an altered image frame of the expanded image frame where one portion of the altered image frame is the modified image frame, and another portion of the altered image frame is black.

d. The claim 2 processor is adapted to "generate a second altered image frame that includes third and fourth non-overlapping portions, wherein the third non-overlapping portion comprises a second portion of the modified image frame, the second portion of the modified image frame being different from the first portion of the modified image frame, wherein the first image frame does not include the fourth non-overlapping portion, wherein the modified image frame does not include the fourth non-overlapping portion. (Ex. 6 at 113:17-26.) The 6-Series generates a second altered image frame of the expanded image frame where one portion of the altered image frame is the modified image frame (but not the portion of the modified image frame that is visible in the first altered image frame), and another portion of the altered image frame (the fourth non-overlapping portion) does not include the image frame or modified image frame, i.e., the other portion is black. (*See* Ex. 6 at 113: 30-31 (dependent claim 3).)

Prayer for Relief

WHEREFORE, VDPP prays for the following relief against TCL:

(a) Judgment that TCL has directly infringed the '380, '444, '922, '452, 487, and '408 patents;

(b) A fair and reasonable royalty;

(c) Pre-judgment interest and post-judgment interest at the maximum rate allowed by law;

(d) A post-judgment injunction; and

(e) Such other and further relief as the Court may deem just and proper.

Date: October 22, 2019

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Demand for Jury Trial

VDPP demands a trial by jury on all matters and issues triable by jury.

Date: October 22, 2019

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