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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

RED.COM, LLC,
Patent Owner.

Case No. IPR2019-01064
Patent No. 9,230,299

**PATENT OWNER RED.COM, LLC'S
PRELIMINARY RESPONSE**

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EXHIBIT LIST

Exhibit No.	Description
2001	Declaration of Graeme Nattress
2002	March 8, 2007 Photograph of Boris testing
2003	March 8, 2007 Photograph of Boris testing
2004	March 8, 2007 Photograph of Boris testing
2005	March 8, 2007 Photograph of Boris testing
2006	March 8, 2007 Photograph of Boris testing
2007	March 8, 2007 Photograph of Boris testing
2008	March 8, 2007 Photograph of Boris testing
2009	Metadata for Exhibits 2002-2008
2010	April 2, 2007 Release Note for Boris and Natasha
2011	Declaration of James H. Jannard
2012	2013 Declaration of James H. Jannard
2013	March 30, 2007 Photograph of Boris on “Crossing the Line”
2014	March 30, 2007 Photograph of Natasha on “Crossing the Line”
2015	Metadata for Exhibit 2013
2016	Metadata for Exhibit 2014
2017	Declaration of Peter Jarred Land
2018	January 29, 2007 Photograph of working compact flash memory
2019	Metadata for Exhibit 2018
2020	April 16, 2007 NAB 2007 photograph
2021	Metadata for Exhibit 2020
2022	Declaration of David Macintosh
2023	Declaration of Rob Lohman

Pursuant to 35 U.S.C. § 313, 37 C.F.R. § 42.107, and the May 15, 2019 Notice of Filing Date Accorded to Petition (Paper 3), Patent Owner RED.COM (“RED”) submits its Preliminary Response to the Petition for *Inter Partes* Review of U.S. Patent No. 9,230,299 (“the ’299 patent,” Ex. 1001) filed by Apple Inc. (“Petitioner”).

I. INTRODUCTION

RED has revolutionized the film industry, beginning in 2007 with the introduction of the RED ONE digital motion-picture camera. Before that time, cinematic film experts were skeptical that any digital video camera recording in compressed format could be used to shoot commercial films. Thus, the film industry at large was reluctant to believe that cinematic-quality resolution and frame rate demanded by movie goers could ever be achieved using digital compression. But the RED ONE changed all that, showing the entire industry that digital motion-picture cameras using compressed digital image data *could* achieve cinematic resolution and picture quality. This revolution was led from the outset by Oscar-winning filmmakers who recognized the innovative and transformative nature of the RED ONE cameras and immediately adopted their use. The revolution of digital cinematic cameras that RED ignited is now manifest, with digital cinema cameras now the industry norm, and with RED as one of the movie industry’s premiere movie camera suppliers.

RED's journey in creating a cinematic-quality digital motion-picture camera began in 2004 as the dream of RED's founder, Mr. Jim Jannard. Mr. Jannard was already well-acquainted with building a successful worldwide brand, having founded Oakley, Inc., a world-renown sunglass, sports equipment and apparel company. But Mr. Jannard's true passion was for cameras, a passion he was able to indulge while shooting Oakley's ads for 20 years. It was from this passion that the idea for RED was born, as Mr. Jannard's frustration with consumer hi-definition video cameras spurred him to build his own camera. This effort snowballed into a larger enterprise of building a cinematic-quality video camera that could combine the low cost and post-production ease and flexibility of digital files, with the high resolution and frame rate of cinema-grade film.

The idea for how to achieve this ambitious goal took shape after a December 2005 meeting between Mr. Jannard and co-inventor, Graeme Nattress. From that discussion, the idea came to life of achieving 2K and 4K resolution by compressing raw digital image data taken from a single image sensor. Thereafter, the two inventors and the design team at RED worked throughout 2006 and into early 2007 to finalize the RED ONE. The results were incredible. Early RED ONE motion-picture cameras were such a success, Academy Award winning director Sir Peter Jackson immediately used them to shoot a mini-movie in late March 2007. A cut of that movie was debuted in April 2007 to great acclaim. After seeing the film, Oscar-

winning director Steven Soderbergh immediately adopted use of the RED ONE camera. Since that time, RED digital cameras have gone on to become ubiquitous in the film industry, being used to shoot everything from TV commercials to Hollywood's biggest blockbusters.

Against this backdrop, Petitioner argues that RED's patents covering this industry-changing technology would have been obvious in view of its primary reference in each ground, Presler. The industry sea-change in digital motion-picture cameras ushered in by RED belies Petitioner's contention, as does Petitioner's failed showing on obviousness. Indeed, Petitioner fails to make its threshold showing of how or why Presler would be combined with Molgaard, its secondary reference, to render the claimed inventions obvious.

Importantly, however, by at least March 2007, RED had reduced to practice two RED ONE motion-picture cameras that could capture compressed raw mosaiced video image data, and could output decompressed, demosaiced video image data in visually lossless form having 4K resolution and a frame rate of 24 frames-per-second. These RED ONE cameras, nicknamed Boris and Natasha, were used to film a production motion picture in March 2007. Thus, by at least that time, the inventors knew that their inventive concept – which would ultimately revolutionize the motion-picture camera industry – worked for its intended purpose. Moreover, prior to the April 13, 2007 filing date of Presler, the Boris and Natasha cameras embodied

at least 25 of the 29 claims challenged in the Petition. Because Petitioner cannot establish a reasonable likelihood of showing that Presler is prior art to at least 25 of the 29 challenged claims, or why, even if considered, Presler would be combined with Molgaard, the Board should deny institution on this record.

II. BACKGROUND

A. Reduction To Practice Of The RED ONE Motion-Picture Camera By At Least March 2007

1. The origin of RED's first commercial digital motion-picture camera, the RED ONE

Mr. Jim Jannard, one of the two named inventors on the '299 patent, had been a camera enthusiast for decades before founding RED. Ex. 2012 (Jannard 2013 Decl.) ¶ 2. Prior to RED, Mr. Jannard had founded performance eyewear and sports equipment manufacturer Oakley, Inc. *Id.* In addition to his duties as President of Oakley, Mr. Jannard used his expertise in photography to personally shoot photographs for most of Oakley's print advertisements and marketing materials, as well as video for Oakley's televised commercials. *Id.* Mr. Jannard was also an avid camera collector, owning over 1000 still and motion cameras. *Id.* While at Oakley, Mr. Jannard was also a prolific inventor, obtaining hundreds of patents on various eyewear and display systems technologies. *Id.* ¶ 3. That inventive spirit carried over to RED, where Mr. Jannard has been intimately involved in the process of designing and building all of RED's video cameras from the ground up. *Id.* ¶ 4.

Mr. Jannard founded RED with the objective of developing the world's best cameras. *Id.* ¶ 5. In particular, Mr. Jannard sought to design digital cinematography cameras that exhibited stunningly superior quality and ease of use compared to the prior art systems. *Id.* In pursuit of this goal, Mr. Jannard met with his co-inventor, Graeme Nattress, for the first time in December 2005. Ex. 2011 (Jannard) ¶ 3; Ex. 2001 (Nattress) ¶ 5. The two-inventors discussed how to obtain cinema-quality resolution from a digital camera that relied on compressed files saved to portable memory. *Id.* This was a formidable goal because, at the time, digital video camera technology produced lower-quality video output that was inadequate for viewing audiences when enlarged to cinema-sized screens. Ex. 1002 at 316 (Nattress 2014 Decl.) ¶ 12. In fact, digital compression was highly disfavored in the high-end cinema camera industry at the time due to its resulting artifacts and lower resolution, which were unacceptable in big-screen cinema. Ex. 2001 (Nattress) ¶ 5.

One potential solution they devised ran directly contrary to industry convention. At the time, it was believed that compressing demosaiced and enhanced image data was superior to compressing *raw mosaiced* image data. Ex. 1002 at 321-22 (Nattress 2014 Decl.) ¶ 24. Raw mosaiced video data was known to be incomplete and spatially non-continuous, and could not be processed with the best compressibility-improving techniques such as color compensation. *Id.* However, the pair realized that compressing demosaiced and enhanced data left lasting effects

in the video image data that could not be reversed after decompression because the effects had essentially been “baked-in” by a combination of the demosaicing-enhancing-compression process. Ex. 2012 (Jannard 2013 Decl.) ¶ 21; Ex. 1002 at 320-21 (Nattress 2014 Decl.) ¶ 22. These lasting effects translated into artifacts that rendered digital compression visually lossy and unacceptable for cinematic uses. *Id.*; Ex. 1002 at 394 (Jackson Decl. ¶ 5), 418 (Soderbergh Decl. ¶ 4). Although none of the implementation guides for the then-available compression codecs provided guidance for how to do so, the pair believed that solving the digital artifact and low-resolution problem required devising a workable method of compressing raw mosaiced data. Ex. 1002 at 322 (Nattress 2014 Decl.) ¶ 25.

One key to this solution involved another move away from industry convention, this time with respect to the type of image sensor used. At the time, the industry consensus held that cinema quality cameras would need to utilize three sensors, with a prism to split red, green and blue light to each sensor. Ex. 2001 (Nattress) ¶ 6. This was in sharp contrast to single sensors, in particular, single sensors with Bayer-pattern filters, that were associated with lower quality, consumer-grade video cameras. *Id.* Thus, Bayer-pattern filter sensors were, at the time, derided as incapable of providing motion picture quality video due to artifact and resolution issues. *Id.* Nevertheless, the duo recognized the potential benefits a Bayer-pattern image sensor could have if the image data remained in raw, mosaiced

format for compression. *Id.* Such a workflow could take advantage of all the post-production flexibility and cost savings of being able to manipulate the original raw data upon decompression. *Id.*

Pursuing these lines of unconventional research and development, the pair set out to design a motion-picture camera that could shoot and compress raw mosaiced Bayer-pattern image data to achieve visually-lossless, cinema-quality output upon decompression, *i.e.*, having at least 2K horizontal resolution and 24 frames per second. Ex. 1002 at 313-14 (Nattress 2014 Decl.) ¶ 6; Ex. 2012 (Jannard 2013 Decl.) ¶ 5.

2. Research and development of the RED ONE Camera

Throughout 2006, the pair worked to implement the solution to the problem of how to create visually lossless video from compressed digital image data from a Bayer-pattern sensor. Assisting them were a team of people at RED, which included Jarred Land, David Macintosh and Rob Lohman. Ex. 2017 (Land) ¶ 2; Ex. 2022 (Macintosh) ¶ 2; Ex. 2023 (Lohman) ¶ 2. RED also utilized the contract engineering services of Wind River Systems, who worked under RED's direction to implement RED's design strategies. Ex. 2011 (Jannard) ¶ 5; Ex. 2017 (Land) ¶ 10; Ex. 2001 (Nattress) ¶ 26; Ex. 2022 (Macintosh) ¶ 2.

During 2006 and into 2007, Mr. Nattress worked to refine the workflow for the digital image data obtained by the Bayer-pattern sensor of the RED ONE camera.

Ex. 2001 (Nattress) ¶¶ 7-13. In particular, Mr. Nattress designed a data workflow, known as REDCODE, that would take raw mosaiced image data from a Bayer-pattern sensor and process that image data for compression in a raw mosaiced state, after which that compressed raw mosaiced image data would be sent to the camera's memory drive for storage. *Id.* ¶ 9. Two particular areas of Mr. Nattress's focus were on the processing and compression steps. *Id.* Mr. Nattress eventually settled on two processing techniques known as pre-emphasis and GAS (green average subtraction), and a lossy compression technique known as JPEG 2000. *Id.* ¶¶ 10-12.

Mr. Nattress and the team at RED worked throughout 2006 and into 2007 with the goal of debuting the RED ONE at the 2007 National Association of Broadcasters (NAB) show to be held in Las Vegas on April 14-19, 2007. Ex. 2001 (Nattress) ¶ 14. In preparation for that show, RED's engineers tested a RED ONE motion-picture camera, nicknamed Boris, at RED's headquarters in Lake Forest, California, on March 8, 2007. Ex. 2001 (Nattress) ¶¶ 14-15; Exs. 2002-2009; Ex. 2011 (Jannard) ¶ 6; Ex. 2017 (Land) ¶ 3; Ex. 2022 (Macintosh) ¶ 3. Jim Jannard, Graeme Nattress, Jarred Land, Ted Schilowitz, David Macintosh and Stuart English were some of the RED engineers present for the testing that day. *Id.* Mr. Nattress captured the event with his own personal photos. Ex. 2001 (Nattress) ¶¶ 14-15, Exs. 2002-2008; Ex. 2011 (Jannard) ¶ 6; Ex. 2017 (Land) ¶ 3; Ex. 2022 (Macintosh) ¶ 3. As

shown below, Mr. Nattress's photos confirm Boris's reduction to practice in succinct, vivid detail.

In the picture below, Mr. Jannard is holding and inspecting Boris before the testing began. Ex. 2001 (Nattress) ¶ 16, Ex. 2002; Ex. 2011 (Jannard) ¶ 7.¹



Ex. 2002.

¹ In Exhibit 2002, a portion of Boris near Mr. Jannard's right thumb between the lens and body is powder-coated black. Subsequent to this testing, the entirety of Boris was powder-coated black. Ex. 2001 (Nattress) ¶ 18, Ex. 2004; Ex. 2011 (Jannard) ¶ 13, Ex. 2013; Ex. 2015 (Land) ¶ 6.

Below, from left to right, are Messrs. Macintosh, Jannard, Schilowitz, Land and English preparing to run test footage on Boris. Ex. 2001 (Nattress) ¶ 17, Ex. 2003; Ex. 2011 (Jannard) ¶ 8; Ex. 2017 (Land) ¶ 4.



Ex. 2003.

The team arranged to shoot video of Mr. Schilowitz next to a color chart to test Boris's video quality. Ex. 2001 (Nattress) ¶ 20, Ex. 2006; Ex. 2011 (Jannard) ¶ 9; Ex. 2017 (Land) ¶ 5. In the picture below, Mr. Schilowitz is seen posing for the test footage. Ex. 2001 (Nattress) ¶ 20, Ex. 2006.



Ex. 2006.

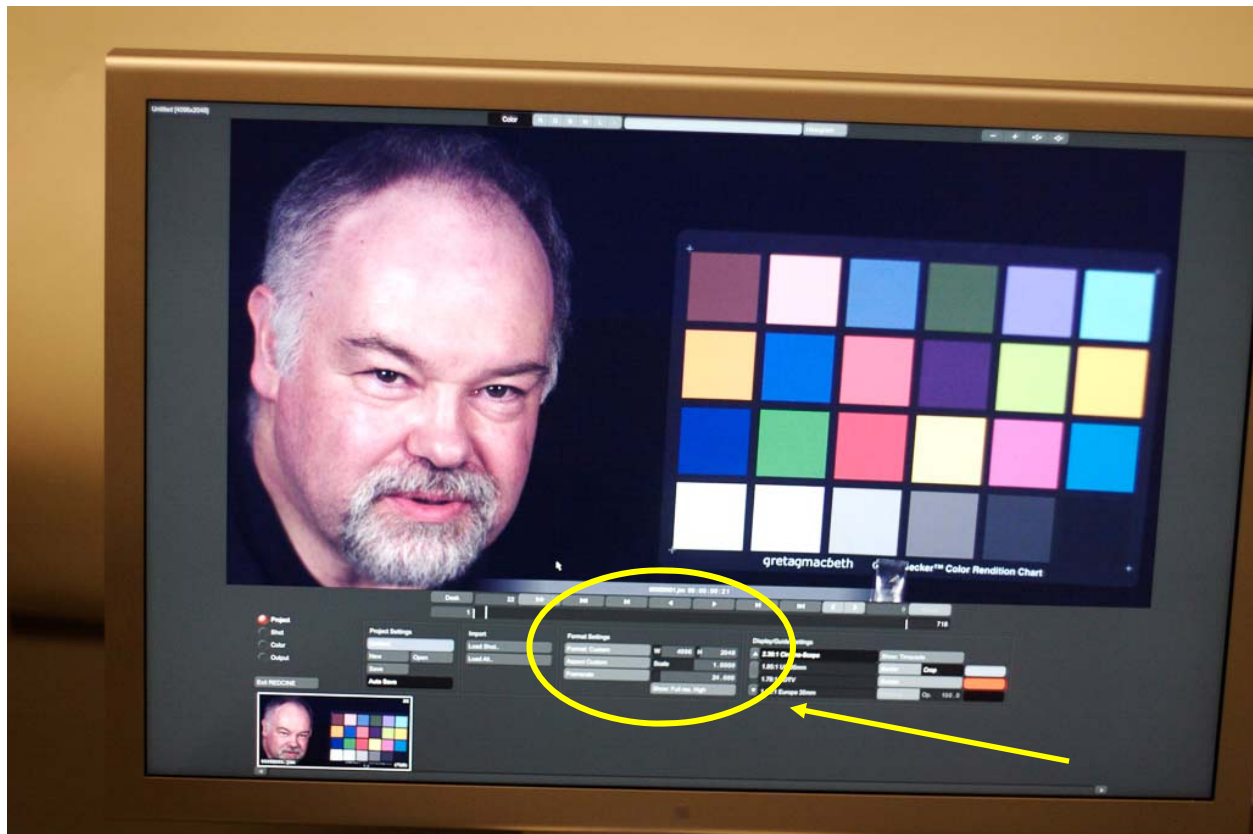
The team then took the digital video file shot by Boris to a computer to see if the video produced cinema-quality, visually lossless video. Ex. 2001 (Nattress) ¶¶ 21-22, Ex. 2007; Ex. 2011 (Jannard) ¶ 9; Ex. 2017 (Land) ¶ 5. Below, Mr. Schilowitz is viewing the output of his test footage. *Id.*



Ex. 2007.

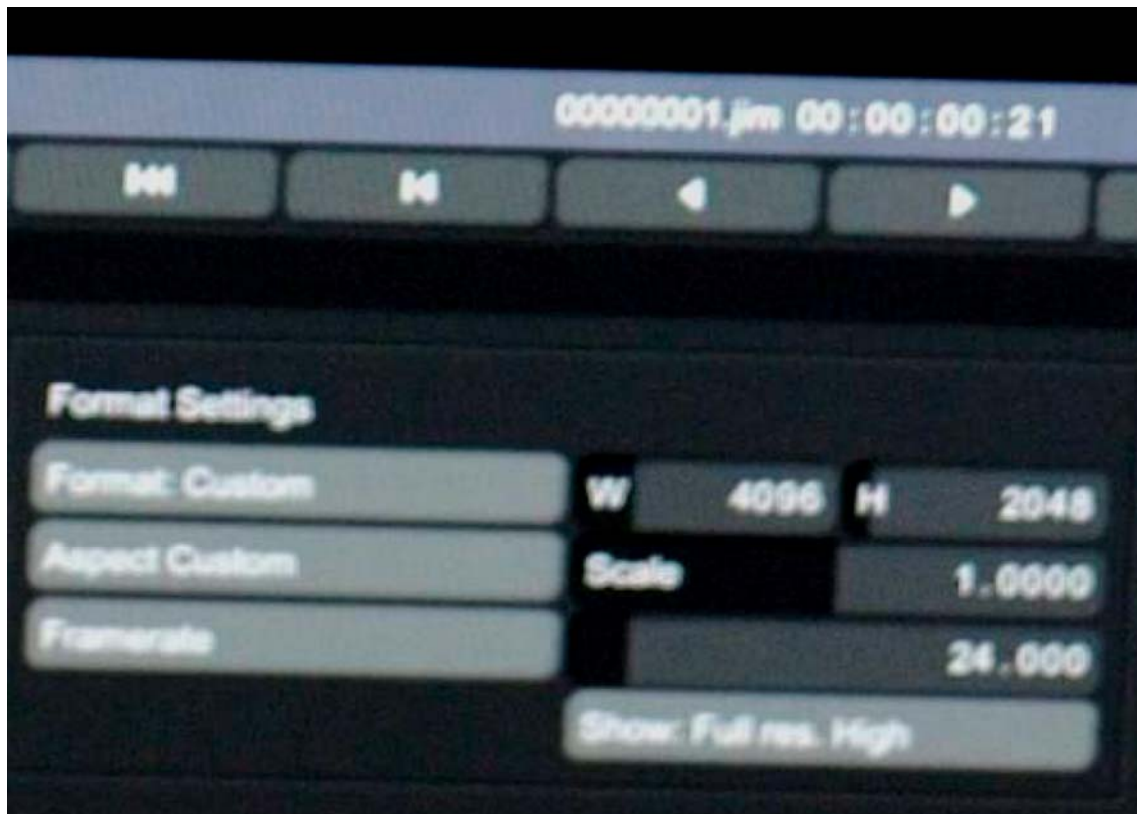
The testing of Boris was a resounding success. Ex. 2001 (Nattress) ¶ 22. The RED team visually inspected the video output and confirmed that Boris had taken compressed raw mosaiced Bayer-pattern video data that displayed in visually lossless form with no visible compression artifacts after decompression and demosaicing. Ex. 2001 (Nattress) ¶ 22; Ex. 2011 (Jannard) ¶ 9; Ex. 2017 (Land) ¶ 5; Ex. 2022 (Macintosh) ¶ 4. Additionally, Boris's cinema-grade high resolution and frame rate were confirmed by the output parameters reported by the program displaying Boris's test video. Ex. 2001 (Nattress) ¶¶ 23-25; Ex. 2008; Ex. 2011 (Jannard) ¶¶ 9-10; Ex. 2017 (Land) ¶ 5; Ex. 2022 (Macintosh) ¶ 4. Specifically, a

photo shown below of the output from Boris's test footage of Mr. Macintosh reports the resolution and frame rate of the footage. Ex. 2001 (Nattress) ¶ 23; Ex. 2008; Ex. 2011 (Jannard) ¶¶ 8-9; Ex. 2017 (Land) ¶ 5; Ex. 2022 (Macintosh) ¶ 4.



Ex. 2008 (with annotations).

Below is an enlargement of the information within the yellow annotation:



Ex. 2001 (Nattress) ¶ 24; Ex. 2011 (Jannard) ¶¶ 9-10. As shown above, the output of the Boris test footage is reported as follows:

Format Settings:

Format Custom: W: 4096 H: 2048

Aspect Custom: Scale: 1.0000

Framerate: 24.000

Show: Full res. High.

Id. At the top of the enlargement, the “.jim” file extension denotes the new compressed raw Bayer-pattern video file type generated by REDCODE. Ex. 2001 (Nattress) ¶¶ 9, 24.

Boris’s output resolution is reported as 4096 x 2048, which equates to 4K resolution. Ex. 2001 (Nattress) ¶ 25; Ex. 2011 (Jannard) ¶ 10. Boris’s framerate is reported as 24 frames per second. *Id.* Based on these reported parameters, and the visually lossless nature of the video output, Messrs. Jannard and Nattress had contemporaneous certainty, by at least March 8, 2007, that their invention worked for its intended purpose. *Id.* As described below, that certainty was soon confirmed by Academy-Award-winning director Sir Peter Jackson. *Id.*

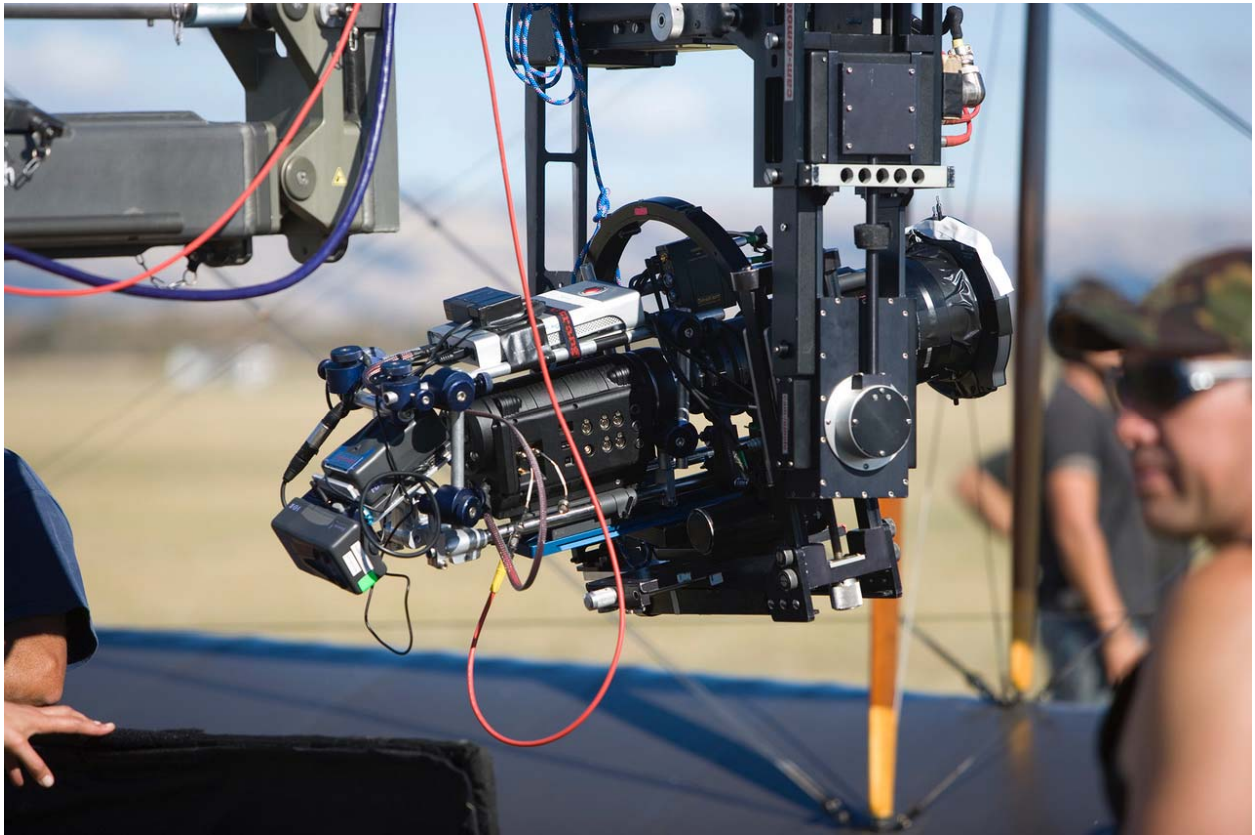
3. Sir Peter Jackson’s March 2007 movie shoot with Boris and Natasha

Because RED’s testing of Boris was such a success, Mr. Jannard sought out a professional cinematographer who could use Boris to shoot a promotional video that RED could present at the upcoming NAB 2007 trade show in April to demonstrate the RED ONE’s revolutionary capabilities. Ex. 2011 (Jannard) ¶ 11. Mr. Jannard reached out to Sir Peter Jackson to see if he had any recommendations. *Id.* In a somewhat unexpected move, Mr. Jackson – who only three years earlier had won Oscars for Best Director and Best Picture for Lord of the Rings: Return of the King – proposed that Mr. Jannard bring the RED ONE cameras to New Zealand so

Mr. Jackson could shoot the footage himself. *Id.*; Ex. 1002 at 397 (Jackson Decl. Ex. B at 5). Mr. Jannard jumped at the chance. Ex. 2011 (Jannard) ¶ 12.

Mr. Jannard and RED President Jarred Land personally flew Boris and its companion RED ONE camera built on the same REDCODE framework, nicknamed Natasha, to New Zealand for the movie shoot during the week of March 26-30, 2007. Ex. 2011 (Jannard) ¶ 12; Ex. 2017 (Land) ¶ 6. Messrs. Jannard and Land stayed at Mr. Jackson's house the entire week, and oversaw his use of the cameras to shoot a mini-movie entitled "Crossing the Line." Ex. 2011 (Jannard) ¶ 12; Ex. 2017 (Land) ¶ 6.

The photo below shows Boris in use at the "Crossing the Line" shoot. Ex. 2011 (Jannard) ¶ 13; Ex. 2013; Ex. 2017 (Land) ¶ 6. Although only a portion of Boris was powder coated black during the March 8, 2007 testing, the remainder of Boris had been powder coated black prior to the "Crossing the Line" shoot. Ex. 2011 (Jannard) ¶ 13; Ex. 2017 (Land) ¶ 6; Ex. 2001 (Nattress) ¶ 18, Ex. 2004.



Ex. 2013.

The photo below shows Natasha, with its original unmilled aluminum coloring, on the set of “Crossing the Line.” Ex. 2011 (Jannard) ¶ 14; Ex. 2014; Ex. 2017 (Land) ¶ 7.



Ex. 2014.

During filming, Mr. Jackson treated Boris and Natasha with the same professional vigor he would any other camera, from crawling on the ground with them to using them on helicopters and Steadicams. Ex. 2011 (Jannard) ¶ 15. The cameras performed flawlessly throughout the entire week. *Id.* ¶¶ 15-16; Ex. 2017 (Land) ¶ 9. According to Mr. Jackson, “[t]he camera was unlike anything we had ever seen before in camera technology.” Ex. 1002 at 394 (Jackson Decl. ¶ 4). Mr. Jackson confirmed that the cameras had the ability to record compressed raw image data at 2K and higher resolutions and remain visually lossless upon decompression. *Id.* at 393-94 (Jackson Decl. ¶¶ 3-4). Mr. Jackson’s satisfaction

with and enthusiasm for Boris and Natasha that week has made him one of the most vocal and devoted users of RED cameras ever since.² Ex. 2011 (Jannard) ¶ 15.

After completing the shoot, a cut of Mr. Jackson’s “Crossing the Line” was premiered in Las Vegas at NAB 2007. Ex. 2011 (Jannard) ¶ 16; Ex. 2017 (Land) ¶ 9. The response was remarkable. *Id.* Academy-Award-winning director Steven Soderbergh saw “Crossing the Line.” Ex. 1002 at 418 (Soderbergh Decl. ¶ 6). So impressed was Mr. Soderbergh with the visually lossless quality of the film, he shot his next several films with RED ONE cameras. *Id.* at 418-19 (¶¶ 6-14).

On April 11, 2007, prior to the NAB 2007 show, RED filed provisional patent application No. 60/911,196 (“the ’196 provisional”), the first of two provisional applications directed to the inventions in its RED ONE camera. Ex. 1010. The ’196 provisional is directed to compressing raw mosaiced Bayer-pattern image data. *Id.* at 20. On December 28, 2007, RED filed its second provisional patent application,

² As of the filing of this Preliminary Response, a video available on YouTube.com at <https://www.youtube.com/watch?v=n-VeXLZTm24> shows Mr. Jackson expressing his appreciation for Red and its team members, and referencing his use of Boris and Natasha on “Crossing the Line.” Footage of “Crossing the Line” was also available online (*e.g.*, <https://www.youtube.com/watch?v=cZT23V07w4Q>).

No. 61/017,406, directed to a video camera that compresses raw mosaiced Bayer-pattern image data. *See, e.g.*, Ex. 1011 at 21-25.

B. Overview Of The '299 Patent

1. The '299 Patent Specification

RED's '299 patent relates to digital video cameras configured to capture and compress, using Huffman compression, raw mosaiced video image data such that, upon decompression and demosaicing, the image data remains substantially visually lossless. Ex. 1001 ('299 patent) at claims 1, 15. Figure 2 of the '299 patent depicts one possible configuration of the claimed digital video cameras:

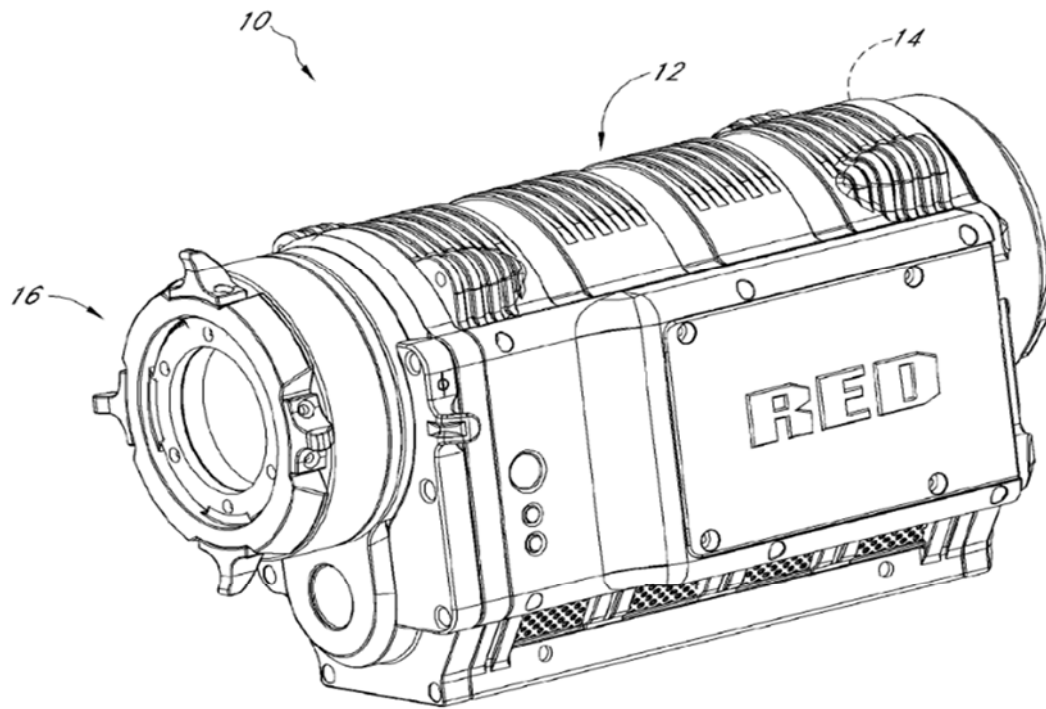


FIG. 2

Aspects of the claimed video cameras recited in independent claim 1 of the '299 patent include (1) a *video camera* with portable housing, (3) an *image sensor*, (4) an *image processing module* configured to process *raw mosaiced image data* from the image sensor, (5) a *compression module* configured to compress the processed image data with a *Huffman compression* technique that upon decompression achieves a substantially visually lossless image of *at least 2k resolution*, (6) a *memory device* that receives the compressed processed image data at a rate of *at least about 23 frames per second*. Several aspects of the claimed

video camera are reflected in the Figure 1 schematic of the '299 patent as shown below:

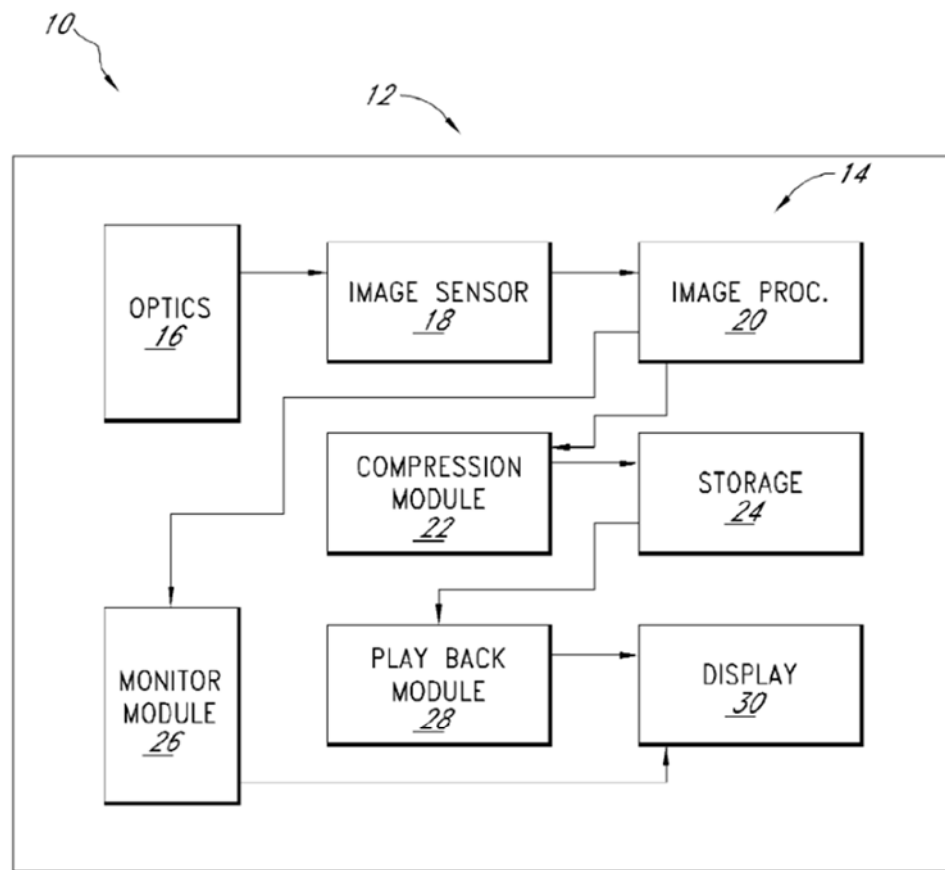


FIG. 1

With respect to the claimed image sensor, the '299 patent describes the use of a single CMOS sensor with a Bayer pattern filter. Ex. 2001 ('299 patent) at 4:5-9, 5:31-42, 11:3-10. Figure 3 of the '299 patent below depicts a schematic layout of a CMOS image sensor having a Bayer pattern filter.

FIG. 3

	$m-3$	$m-2$	$m-1$	m	$m+1$	$m+2$	$m+3$	$m+4$
$n-3$	$B_{m-3,n-3}$	$G_{m-2,n-3}$	$B_{m-1,n-3}$	$G_{m,n-3}$	$B_{m+1,n-3}$	$G_{m+2,n-3}$	$B_{m+3,n-3}$	$G_{m+4,n-3}$
$n-2$	$G_{m-3,n-2}$	$R_{m-2,n-2}$	$G_{m-1,n-2}$	$R_{m,n-2}$	$G_{m+1,n-2}$	$R_{m+2,n-2}$	$G_{m+3,n-2}$	$R_{m+4,n-2}$
$n-1$	$B_{m-3,n-1}$	$G_{m-2,n-1}$	$B_{m-1,n-1}$	$G_{m,n-1}$	$B_{m+1,n-1}$	$G_{m+2,n-1}$	$B_{m+3,n-1}$	$G_{m+4,n-1}$
n	$G_{m-3,n}$	$R_{m-2,n}$	$G_{m-1,n}$	$R_{m,n}$	$G_{m+1,n}$	$R_{m+2,n}$	$G_{m+3,n}$	$R_{m+4,n}$
$n+1$	$B_{m-3,n+1}$	$G_{m-2,n+1}$	$B_{m-1,n+1}$	$G_{m,n+1}$	$B_{m+1,n+1}$	$G_{m+2,n+1}$	$B_{m+3,n+1}$	$G_{m+4,n+1}$
$n+2$	$G_{m-3,n+2}$	$R_{m-2,n+2}$	$G_{m-1,n+2}$	$R_{m,n+2}$	$G_{m+1,n+2}$	$R_{m+2,n+2}$	$G_{m+3,n+2}$	$R_{m+4,n+2}$
$n+3$	$B_{m-3,n+3}$	$G_{m-2,n+3}$	$B_{m-1,n+3}$	$G_{m,n+3}$	$B_{m+1,n+3}$	$G_{m+2,n+3}$	$B_{m+3,n+3}$	$G_{m+4,n+3}$
$n+4$	$G_{m-3,n+4}$	$R_{m-2,n+4}$	$G_{m-1,n+4}$	$R_{m,n+4}$	$G_{m+1,n+4}$	$R_{m+2,n+4}$	$G_{m+3,n+4}$	$R_{m+4,n+4}$

As Figure 3 shows, Bayer filter patterns are characterized by two green pixels for every blue and red pixel, which takes advantage of the human eye's sensitivity to green wavelengths. *Id.* at 2:22-24, 11:8-10. Figure 3 also depicts the three pluralities of light sensitive devices (green, blue and red pixels) arranged in an intermingled plane as required by claims 1 and 15.

The patent also describes a processing module for processing raw mosaiced image data from the image sensor using techniques that enhance the compressibility of the data, while also allowing the image data to remain visually lossless after decompression. *Id.* at 7:55-57. These processing methods include pre-emphasis and

subtracting the green image data from each of the blue and red image data components. *Id.* at 7:37-8:26; 11:43-44, 12:13-15. An exemplary flowchart of this image processing is shown in Figure 8 of the patent below:

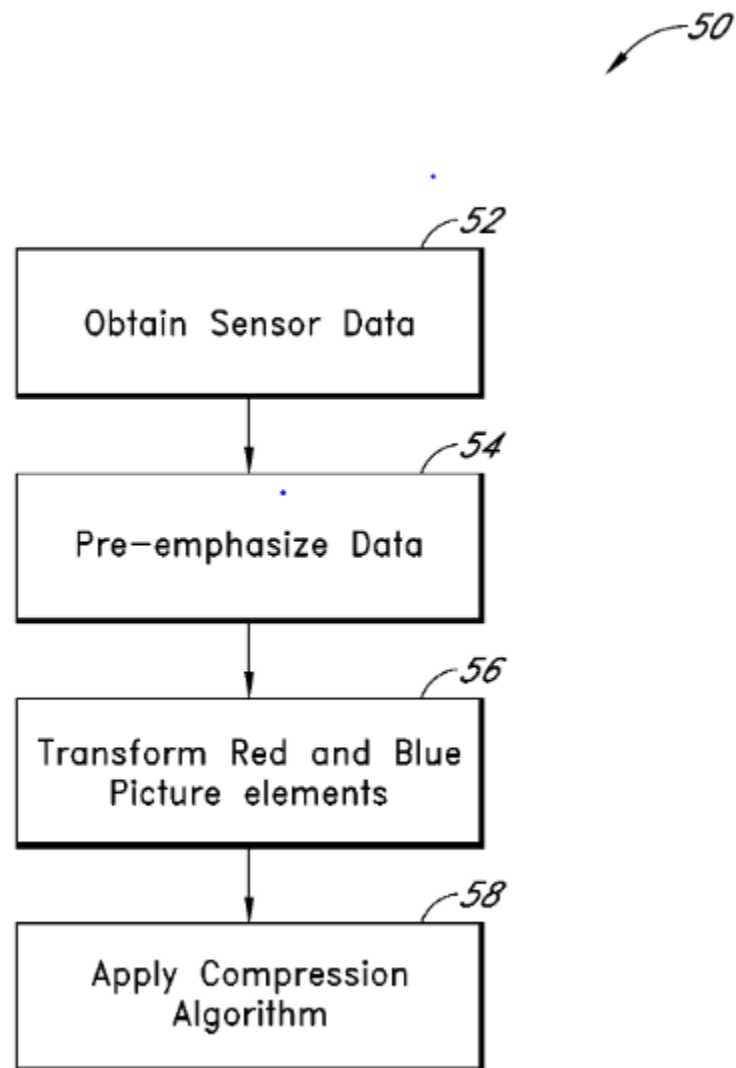


FIG. 8

The patent specification further states that “although the image data has been transformed (e.g., by the subtraction of green image data) all of the raw image data is still available to an end user. For example, by reversing certain of the processes, all or substantially all of the original raw data can be extracted and thus further processed, filtered, and/or demosaiced using any process the user desires.” *Id.* at 13:16-22; *see also id.* at 2:46-47.

As shown in patent Figures 1 and 8 above, this processed image data is then provided to a compression module, which utilizes known compression techniques such as JPEG 2000 or Huffman. *Id.* at 9:25-32. Based on the disclosed image processing techniques, the compression module can compress the image data at a ratio of 6:1 or greater while remaining visually lossless upon decompression. *Id.* at 9:33-47, 13:12-16. The patent indicates that “visually lossless” includes “output that, when compared side by side with original (never compressed) image data on the same display device, one of ordinary skill in the art would not be able to determine which image is the original with a reasonable degree of accuracy, based only on a visual inspection of the images.” *Id.* at 9:55-60.

As seen in Figure 1, the compressed image data is sent to a storage device, which can include hard disks, flash memory, or any other type of memory device. *Id.* at 9:61-10:3. The patent discloses that the storage/memory device can be

mounted to the exterior of the camera housing and connected via flexible cable, such as a SATA cable. *Id.* at 4:32-45, 10:4-9.

2. The '299 Patent Claims

The '299 patent has 29 claims, of which claims 1 and 15 are independent. Claim 1 is a device claim, while claim 15 is a method claim. The limitations in claim 15 generally track those recited in independent claim 1. Claim 1 is reproduced below:³

Claim 1:

- 1.0 A video camera comprising:
 - 1.1 a portable housing having an opening through which light emanating from outside the portable housing enters the portable housing;
 - 1.2 a memory device supported by the portable housing;
 - 1.3.0 an image sensor comprising first, second, and third pluralities of light sensitive devices arranged with respect to one another in a plane defined by the image sensor

³ The Petition applies a limitation-numbering scheme to the limitations of the claims. While the limitation numbers are not part of the claims, Patent Owner includes them and uses them herein for ease of reference.

- 1.3.1 such that the first, second, and third pluralities of light sensitive devices are intermingled, defining an intermingled pattern,
- 1.3.2 the first, second, and third pluralities of light sensitive devices being configured to detect first, second, and third colors, respectively, the first, second, and third colors being different from each other,
- 1.3.3 the image sensor being configured to convert light entering the portable housing through the opening into raw mosaiced image data comprising one data value for each of the light sensitive devices included in the first, second, and third pluralities of light sensitive devices,
- 1.3.4 the image sensor being configured to output the raw mosaiced image data at a resolution of at least 2 k and at a frame rate of at least about 23 frames per second; and
- 1.4 electronics having an image processing module and a compression module implemented therein,
- 1.5.0 the image processing module connected between the image sensor and the memory device,
- 1.5.1 the image processing module configured to process the raw mosaiced image data from the image sensor and output processed image data based on the raw mosaiced image data from the image sensor,

- 1.5.2 the processed image data including less than three data values for each of the light sensitive devices included in the first, second, and third pluralities of light sensitive devices, and
- 1.6.0 the compression module connected between the image sensor and the memory device,
- 1.6.1 the compression module configured to compress the processed image data with a Huffman compression technique into compressed processed image data
- 1.6.2 such that the compressed processed image data can be decompressed and demosaiced into a substantially visually lossless image of at least 2 k resolution,
- 1.7 wherein the memory device receives the compressed processed image data at a rate of at least about 23 frames per second.

3. Claim Construction And Level Of Skill In The Art

For purposes of this Preliminary Response, Patent Owner does not dispute Petitioner's contentions on claim construction or the level of skill in the art. Pet. at 6-10. Patent Owner reserves the right to take differing positions in other forums or if the Board orders institution.

4. Petitioner's Asserted Grounds

Petitioner presents three grounds for *inter partes* review based on the following five references:

<i>Exhibit No.</i>	<i>Reference</i>	<i>Shorthand Name</i>
Ex. 1005	U.S. Patent No. 9,565,419	Presler
Ex. 1006	U.S. Patent No. 7,656,561	Molgaard
Ex. 1013	U.S. Patent No. 7,349,574	Sodini
Ex. 1014	U.S. Patent No. 8,170,402	Frost
Ex. 1015	U.S. Patent No. 5,600,373	Chui

Petitioner contends claims 1-29 of the '299 patent are obvious based on these three grounds:

<i>Ground</i>	<i>References</i>	<i>Basis</i>	<i>Claims Challenged</i>
1	Presler in view of Molgaard and Chui	§ 103	1-9, 11-12, 14-24, 26-27, 29
2	Presler in view of Molgaard, Chui, and Sodini	§ 103	10, 25
3	Presler in view of Molgaard, Chui and Frost	§ 103	13, 28

Pet. at 10-11.

5. Relationship To IPR2019-01065

Petitioner's co-pending IPR2019-01065 challenges RED's U.S. Patent No. 9,245,314 (the "'314 patent"), which shares the same specification and claims priority to the same parent applications as the '299 patent. The '299 and '314 patents are directed to similar inventions, with the primary difference between the two

patents found in the compression limitations of the two respective independent claims in each patent. The '299 patent claims recite a Huffman (i.e., lossless) compression technique, while the '314 patent claims recite a mathematically lossy compression technique. Petitioner relies on the same primary and secondary references (Presler and Molgaard, respectively) in both Petitions. The POPRs submitted in each Petition are roughly the same, but differ slightly to address the different compression techniques recited by the respective independent claims.

III. ARGUMENT

A. Legal Standard

1. Threshold For Institution

The statutory threshold that must be met to institute an IPR reads as follows:

(a) THRESHOLD – The Director may not authorize an inter partes review to be instituted unless the Director determines that the information presented in the petition . . . shows that there is a *reasonable likelihood that the petitioner would prevail* with respect to at least 1 of the claims challenged in the petition.

35 U.S.C. § 314(a) (emphasis added); accord 37 C.F.R. § 42.108(c).

2. Reduction To Practice

“To antedate (or establish priority) of an invention, a party must show either an earlier reduction to practice, or an earlier conception followed by a diligent reduction to practice.” *Purdue Pharma L.P. v. Boehringer Ingelheim GMBH*, 237

F.3d 1359, 1365 (Fed. Cir. 2001). “To establish an actual reduction to practice, the inventor must prove that: (1) an embodiment of the invention was constructed that meets all the limitations of the claims at issue; and (2) the inventor appreciated that the invention would work for its intended purpose.” *Nintendo Am., Inc. v. iLife Techs., Inc.*, No. IPR2015-00112, Paper No. 39 at 31 (P.T.A.B. Apr. 29, 2016) (citing *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998)). The “fact that further refinements of the invention were made is not relevant.” *Dynamic Drinkware LLC v. Nat’l Graphics, Inc.*, No. IPR2013-00131, Paper No. 42 at 12 (P.T.A.B. Sept. 12, 2014), *aff’d*, 800 F.3d 1375 (Fed. Cir. 2015) (citing *Cooper*, 154 F.3d at 1327).

“[T]he party seeking to prove an actual reduction to practice must proffer evidence corroborating that testimony.” *Nintendo*, No. IPR2015-00112, Paper No. 39 at 31 (citing *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1170 (Fed. Cir. 2006)). “Sufficiency of corroboration is determined by using a ‘rule of reason’ analysis, under which all pertinent evidence is examined when determining the credibility of an inventor’s testimony.” *Id.* “Corroboration may be testimony of a witness, other than the inventor, to the actual reduction to practice, or it may consist of evidence of surrounding facts and circumstances independent of information received from the inventor.” *Id.*

B. Presler Does Not Qualify As Prior Art

Petitioner relies on Presler as its primary obviousness reference for all three asserted grounds, arguing that Presler has a 102(e) priority date of April 13, 2007. Pet. at 10-11. Petitioner also argues that the '299 patent is not entitled to the April 11, 2007 filing date of its earliest provisional application. Pet. 3-5. However, as demonstrated in the sections below, RED's reduction to practice of the Boris and Natasha RED ONE motion-picture cameras by March 2007 disqualifies Presler as prior art to at least 25 of the 29 challenged claims of the '299 patent.

Moreover, as shown in Sections II.A.2-3 above, the inventors Messrs. Jannard and Nattress knew by at least March 2007, based on their own successful testing of the Boris motion-picture camera, that their invention worked for its intended purpose – an understanding that was further bolstered by director Sir Peter Jackson's use of Boris later that month to successfully shoot a motion picture. Ex. 2001 (Nattress) ¶ 25; Ex. 2011 (Jannard) ¶¶ 11-16; Ex. 1002 at 393-94 (Jackson Decl. ¶¶ 3-4); Ex. 1002 at 418 (Soderbergh Decl. ¶ 6).

Finally, RED's successful reduction to practice is corroborated by photographs, documentation, the testimony of current and former non-inventor employees who had direct personal knowledge and involvement with the RED ONE project, and the testimony of Academy Award winners Sir Peter Jackson and Steven Soderbergh. Indeed, with respect to their qualifications to assess the visually lossless

nature of the video produced by the Boris and Natasha cameras, Messrs. Jackson and Soderbergh have few peers as Oscar-winning directors. Their formidable professional reputations are staked upon the visual quality of their films. Artifacts from digital compression are simply unacceptable. Tellingly, both Messrs. Jackson and Soderbergh are profuse with their praise of, and steadfast in their loyalty to, RED digital video cameras, and believe the RED ONE technology embodied in Boris and Natasha to have been pioneering. Ex. 1002 at 394-95 (Jackson Decl. ¶¶ 5-10), 419 (Soderbergh Decl. ¶¶ 15-16).

Under a rule-of-reason analysis, the weight of the totality of the evidence and corroboration of RED's antedating reduction to practice – that occurred over ten years ago – provides a sufficient basis for, and lends credibility to, Messrs. Jannard and Nattress's testimony. In the interests of judicial economy and conservation of Office resources, the Board should deny institution of the present Petition.

1. Claim 1

a. A video camera

The preamble [1.0] and limitation [1.1] of claim 1 recite “[**1.0**] A video camera comprising: [**1.1**] a portable housing having an opening through which light emanating from outside the portable housing enters the portable housing . . .”

As shown below, the Boris RED ONE motion-picture camera tested at RED's headquarters on March 8, 2007, was a video camera with a portable housing having

a lens to capture light emanating from outside the housing. Ex. 2001 (Nattress) ¶ 19; Ex. 2002; Ex. 2005; Ex. 2010 at 5.



Ex. 2002.

b. A memory device

Claim 1 next requires “[1.2] a memory device supported by the portable housing . . .”

An April 2, 2007 Release Note for Boris and Natasha confirms that the video cameras “capture[d] 24 FPS video *to the HDD* [hard disk drive] . . .” Ex. 2010 at 5 (emphasis added). Boris and Natasha utilized a memory device connected via a

SATA cable that could be mounted to the top of the camera housing. Ex. 2017 (Land) ¶ 8.

c. An image sensor

The next set of limitations require an image sensor having three different light sensitive devices. Those limitations appear in Claim 1 as follows:

[1.3.0] an image sensor comprising first, second, and third pluralities of light sensitive devices arranged with respect to one another in a plane defined by the image sensor

[1.3.1] such that the first, second, and third pluralities of light sensitive devices are intermingled, defining an intermingled pattern,

[1.3.2] the first, second, and third pluralities of light sensitive devices being configured to detect first, second, and third colors, respectively, the first, second, and third colors being different from each other,

[1.3.3] the image sensor being configured to convert light entering the portable housing through the opening into raw mosaiced image data comprising one data value for each of the light sensitive devices included in the first, second, and third pluralities of light sensitive devices,

These limitations generally describe a Bayer-pattern image sensor, which is a sensor having a mosaically arranged color filter that detects the luminosity of a single red, green or blue pixel. *See, e.g.*, Ex. 1002 at 316-17, 324, 350 (Nattress 2014 Decl.

¶¶ 13-14, 31, Ex. B). Additionally, a Bayer-pattern filter contains twice as many green pixel filters as red or blue. *Id.*

Petitioner contends that an image sensor with a Bayer-pattern filter satisfies these limitations. Pet. at 21-30. As they were designed from the start, the RED ONE motion-picture cameras employed sensors with Bayer-pattern filters. Ex. 2001 (Nattress) ¶¶ 6, 8-13; Ex. 2017 (Land) ¶ 11; Ex. 2022 (Macintosh) ¶ 5; Ex. 2023 (Lohman) ¶ 3. In particular, the RED ONE cameras, including Boris and Natasha, employed a Mysterium CMOS image sensor, which implemented a Bayer pixel pattern. Ex. 2001 (Nattress) ¶ 9; Ex. 2017 (Land) ¶ 11; Ex. 2023 (Lohman) ¶ 3.

d. An image sensor outputting raw data at 4K and 23 frames per second

The next limitation in Claim 1 recites “[1.3.4] the image sensor being configured to output the raw mosaiced image data at a resolution of at least 2 k and at a frame rate of at least about 23 frames per second . . .”

The Mysterium CMOS image sensor in the RED ONE cameras, including Boris and Natasha, outputted the raw mosaiced video image data at a resolution of at least 2K and at least 23 frames per second. Ex. 2001 (Nattress) ¶ 9; Ex. 2010 at 5 (“capture 24 FPS [frames per second] video . . .”); *id.* at 6 (“Capture of R4KR [REDCODE 4K raw] to disk at 24 FPS . . .”).

e. Image processing and compression modules

Claim 1 next recites “[1.4] electronics having an image processing module and a compression module implemented therein, [1.5.0] the image processing module connected between the image sensor and the memory device”

The RED ONE cameras, including Boris and Natasha, utilized image processing and compression modules, both of which were positioned between the image sensor and memory device. Ex. 2001 (Nattress) ¶ 9; Ex. 2017 (Land) ¶ 11; Ex. 2022 (Macintosh) ¶ 5; Ex. 2023 (Lohman) ¶¶ 3-4. In particular, the processing module was manufactured by Xilinx, and the compression chips were manufactured by Analog Devices. Ex. 2001 (Nattress) ¶ 9; Ex. 2017 (Land) ¶ 11.

f. Processing module for processing the raw image data

Claim 1 next recites,

[1.5.1] the image processing module configured to process the raw mosaiced image data from the image sensor and output processed image data based on the raw mosaiced image data from the image sensor,

[1.5.2] the processed image data including less than three data values for each of the light sensitive devices included in the first, second, and third pluralities of light sensitive devices, and

The Xilinx processing module in the RED ONE cameras, including Boris and Natasha, received raw mosaiced image data from the image sensor and output the

processed image data based on the raw mosaiced image data from the image sensor. Ex. 2001 (Nattress) ¶ 9; Ex. 2017 (Land) ¶ 11; Ex. 2022 (Macintosh) ¶ 5; Ex. 2023 (Lohman) ¶¶ 3-4. Moreover, Petitioner asserts that a processor receiving raw mosaiced image data from a Bayer sensor satisfies the claim language of limitations [1.5.1] - [1.5.2]. Pet. at 34-38, 49-50. The processor in the RED ONE cameras, including Boris and Natasha, received raw mosaiced image data from a Bayer-pattern image sensor that detected only one data value for each of the green, red and blue pixel locations. Ex. 2001 (Nattress) ¶¶ 9-13; Ex. 2017 (Land) ¶ 11; Ex. 2022 (Macintosh) ¶ 5; Ex. 2023 (Lohman) ¶ 3.

g. Compression module utilizing Huffman compression

Claim 1 next recites,

[1.6.0] the compression module connected between the image sensor and the memory device,

[1.6.1] the compression module configured to compress the processed image data with a Huffman compression technique into compressed processed image data

The Analog Devices compression module in the RED ONE cameras, including Boris and Natasha, was connected between the Bayer-pattern image sensor and the memory device, and utilized JPEG 2000 compression. Ex. 2001 (Nattress) ¶ 9; Ex. 2010 at 8 (“preserving low level noise through the JP2 [JPEG 2000]

compression”); Ex. 2017 (Land) ¶ 11; Ex. 2022 (Macintosh) ¶ 5; Ex. 2023 (Lohman) ¶¶ 3-4. JPEG 2000 is a mathematically lossy wavelet compression technique that compresses the processed raw image data from the sensor. Ex. 2001 (Nattress) ¶ 9; Ex. 2023 (Lohman) ¶ 4; Ex. 1003 at 76-77.

While Boris and Natasha used lossy compression, the ’299 patent claims recite the use of Huffman compression. Nevertheless, a patent owner may antedate a reference even if there are differences between the patent owner’s evidence of actual reduction to practice and the challenged claim. Specifically, to the extent any such differences exist, the patent owner may antedate the reference “by showing that *the differences* between the claimed invention and the showing [of reduction to practice] . . . *would have been obvious to one of ordinary skill in the art,*” in view of the patent owner’s evidence. M.P.E.P. § 715.02 (9th Ed. Rev. 8, Jan. 2018) (emphases added); see *In re Spiller*, 500 F.2d 1170, 1178 n.5 (C.C.P.A. 1974) (Rich, J.). Such a showing is sufficient to antedate a reference because the patent owner’s reduction to practice “carries with it possession of variations and adaptations which would, at the same time, be obvious to one skilled in the art.” *In re Spiller*, 500 F.2d at 1178 n.5, 1176-78.

Huffman compression is a lossless compression technique that has been well known in the art for several decades. Nattress Decl. ¶ 30. For example, Petitioner’s exhibit 1015, a U.S. patent issued in 1997, refers to Huffman encoding as a

“conventional lossless data compression technique[] . . .” Ex. 1015 at 1:56-60. Petitioner’s declarant also argues that Huffman compression was a known technique whose implementation was within the level of ordinary skill in the art. Ex. 1003 at 60.

Although a lossless compression technique provides a lower compression ratio than lossy compression, this impacts the write speed and memory on the hard drive. Nattress Decl. ¶ 31. It does not lower the visual quality of the output. *Id.* Thus, because the REDCODE on Boris produced visually lossless output with a lossy compression technique, a person of ordinary skill in the art would know that REDCODE would successfully produce visually lossless output using a lossless compression routine like Huffman compression. *Id.* This result follows necessarily because a lossless compression technique removes any potentiality for compression artifacts caused by lossless compression. *Id.*

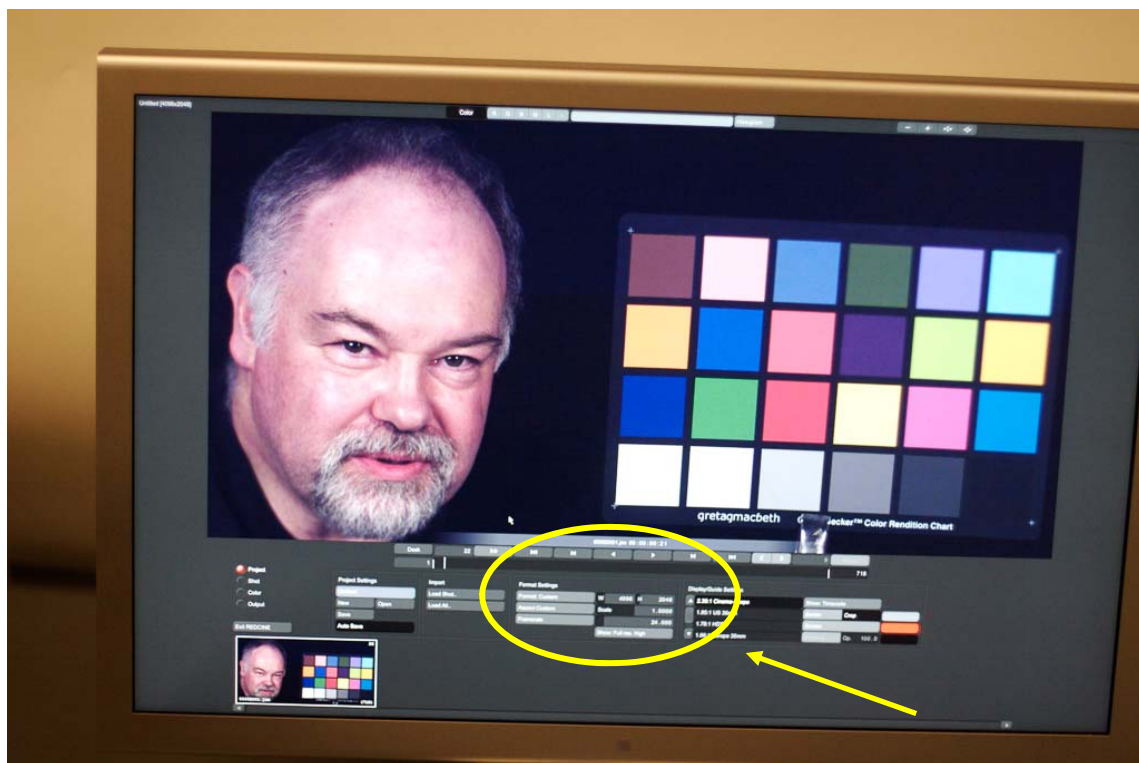
Accordingly, the reduction to practice of RED’s novel and nonobvious video camera capable of visually lossless output using lossy compression was tantamount to reducing to practice a video camera capable of visually lossless output using Huffman (i.e., lossless) compression. As established by Petitioner’s own reference and declarant, such a variation on the compression technique was conventional, and implementation of that conventional variation was well within the capability of those of skill in the art.

h. Substantially visually lossless image at 2K resolution and 24 frames per second

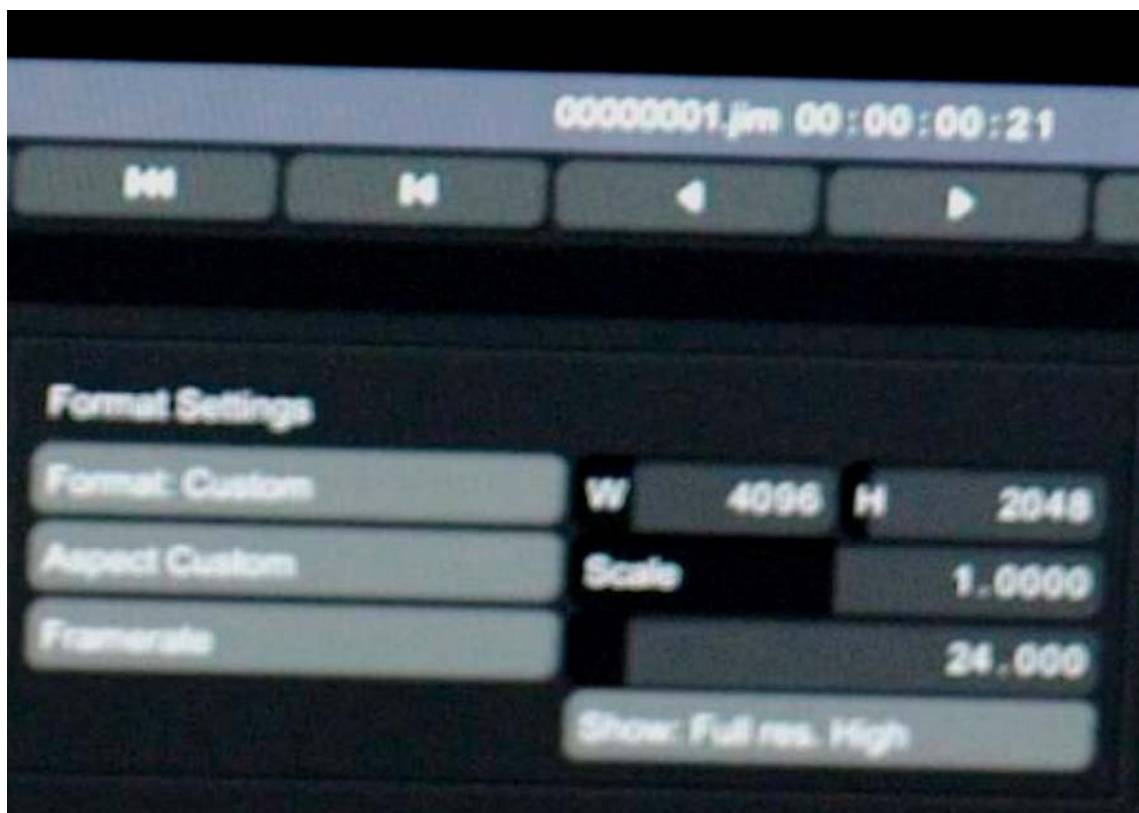
Lastly, Claim 1 recites, “[1.6.2] such that the compressed processed image data can be decompressed and demosaiced into a substantially visually lossless image of at least 2 k resolution, [1.7] wherein the memory device receives the compressed processed image data at a rate of at least about 23 frames per second.”

The team at RED confirmed during the March 8, 2007 testing of Boris that it produced visually lossless video output after decompression and demosaicing. Ex. 2001 (Nattress) ¶¶ 22, 25; Ex. 2011 (Jannard) ¶ 9; Ex. 2017 (Land) ¶ 5; Ex. 2022 (Macintosh) ¶ 4; *see also* Ex. 2001 (Nattress) ¶¶ 27-29; Ex. 2010 at 5 (“Captured .jim files were verified by Diamond’s [RED’s] Graeme [Nattress] and David Macintosh to produce expected quality and the expected results . . .”).

The RED team also confirmed that the video files recorded by Boris outputted with 4K (i.e., 4096 x at 2048) resolution at 24 frames per second. Ex. 2001 (Nattress) ¶¶ 23-25; Ex. 2008; Ex. 2011 (Jannard) ¶¶ 9-10; Ex. 2017 (Land) ¶ 5; Ex. 2022 (Macintosh) ¶ 4.



Ex. 2008 (with annotations).



Ex. 2008 (enlargement).

The April 2, 2007 Release Note for Boris and Natasha confirms that the cameras captured “R4KR [REDCODE 4K raw] to disk at 24 FPS [frames per second].” Ex. 2001 (Nattress) Ex. 2010 at 6; *see also id.* at 5 (“This version of the software produces Redcode 4K Raw .JIM files . . .”) (“It has been demonstrated to . . . capture 24 FPS video to the HDD . . .”).

Director Sir Peter Jackson also confirmed through his “Crossing the Line” film shoot in March 2007 that Boris and Natasha provided a visually lossless output. Ex. 1002 at 393-94 (Jackson Decl. ¶¶ 3-4). Director Steven Soderbergh, who viewed Mr. Jackson’s “Crossing the Line” film made with the Boris and Natasha, also recognized the visually lossless quality of the “Crossing the Line” footage shot with those cameras in March 2007. Ex. 1002 at 418 (Soderbergh Decl. ¶ 6).

2. Claim 2

Claim 2 recites the following limitations:

[2.0] A video camera according to claim 1 wherein the image sensor is configured to output the raw mosaiced image data at a resolution of at least 2 k and at a frame rate of at least 23 frames per second,

[2.1] wherein the compressed processed image data can be decompressed and demosaiced into a visually lossless image of at least 2 k resolution,

[2.2] and wherein the memory device receives the compressed processed image data at a rate of at least 23 frames per second.

The Boris and Natasha RED ONE cameras embodied these limitations for the reasons stated at claim limitations [1.3.4], [1.6.2], and [1.7].

3. Claim 3

Claim 3 recites the following limitations:

[3.0] A video camera according to claim 1 wherein the image sensor is configured to output the raw mosaiced image data at a resolution of at least 4 k,

[3.1] and the compressed processed image data can be decompressed and demosaiced into a substantially visually lossless image of at least 4 k resolution.

The Boris and Natasha RED ONE cameras embodied these limitations for the reasons stated at claim limitations [1.3.4] and [1.6.2].

4. Claim 4

Claim 4 recites the following limitations:

[4.0] A video camera according to claim 1 wherein the image sensor is configured to output the raw mosaiced image data at a resolution of at least 4 k and at a frame rate of at least 23 frames per second,

[4.1] wherein the compressed processed image data can be decompressed and demosaiced into a visually lossless image of at least 4 k resolution,

[4.2] and wherein the memory device receives the compressed processed image data at a rate of at least 23 frames per second.

The Boris and Natasha RED ONE cameras embodied these limitations for the reasons stated at claim limitations [1.3.4], [1.6.2], and [1.7].

5. Claim 5

Claim 5 recites the following limitations:

[5.0] A video camera according to claim 1 wherein the one data value for each of the first plurality of light sensitive devices is representative of light of only the first color, the one data value for each of the second plurality of light sensitive devices is representative of light of only the second color, and the one data value for each of the third plurality of light sensitive devices is representative of only the third color,

[5.1] and wherein the processed image data does not include separate data values for the first, second, and third colors for each of the light sensitive devices.

The Boris and Natasha RED ONE cameras embodied these limitations for the reasons stated at claim limitations [1.3.0]-[1.3.3] and [1.5.1] - [1.5.2].

6. Claim 6

Claim 6 recites “[6.0] A video camera according to claim 1 wherein the memory device is disposed within the portable housing.”

See infra Section III.B.16.

7. Claim 7

Claim 7 recites “[7.0] A video camera according to claim 1 wherein the memory device is supported on the outside of the portable housing.”

The Boris and Natasha RED ONE cameras embodied this limitation for the reasons stated at claim limitation [1.2].

8. Claim 8

Claim 8 recites the following limitations:

[8.0] A video camera according to claim 1 additionally comprising a playback module configured to receive the compressed processed image data from the memory device,

[8.1] and decompress and demosaic the compressed processed image data into demosaiced image data that includes three data values for each of the light sensitive devices included in the first, second, and third pluralities of light sensitive devices.

See infra Section III.B.16.

9. Claim 9

Claim 9 recites “[9.0] A video camera according to claim 1 wherein the compression module comprises a compression chip.”

The Boris and Natasha RED ONE cameras embodied this limitation for the reasons stated at claim limitation [1.4].

10. Claim 10

Claim 10 recites the following limitations:

[10.0] A video camera according to claim 1 wherein the image processing module is configured to process the raw mosaiced image data at least in part by applying a pre-emphasis function to the raw mosaiced image data, wherein the pre-emphasis function is configured to increase data values of the mosaiced image data corresponding to relatively dark image regions and to decrease data values of the mosaiced image data corresponding to relatively bright image regions.

The RED ONE cameras, including Boris and Natasha, utilized pre-emphasis processing on the raw mosaiced image data from the image sensor. Ex. 2001 (Nattress) ¶¶ 10, 12, 29; Ex. 2023 (Lohman) ¶ 3. This pre-emphasis function operated to increase data values of the mosaiced image data corresponding to relatively dark image regions, and to decrease data values of the mosaiced image data corresponding to relatively bright image regions. *Id.* The April 2, 2007 Release Note for Boris and Natasha states that the “new RED/BLUE pre-emphasis mode” was incorporated to help address low light areas, and referred to an adjustment to the pre-emphasis functionality already running in REDCODE. Ex. 2010 at 8; *see also* Ex. 2010 at 4, 5; Ex. 2001 (Nattress) ¶ 29.

11. Claim 11

Claim 11 recites the following limitations:

[11.0] A video camera according to claim 1 wherein the image sensor is configured to output the raw mosaiced image data at a resolution falling within a range between and inclusive of 2 k and 4.5 k and at a frame rate falling within a range between and inclusive of 23 and 120 frames per second,

[11.1] wherein the compression module is configured to compress the processed image data with a Huffman compression technique into compressed processed image data

[11.2] such that the compressed processed image data can be decompressed and demosaiced into a substantially visually lossless image having a resolution falling within a range between and inclusive of 2 k and 4.5 k resolution,

[11.3] and wherein the memory device receives the compressed processed image data at a rate falling within a range between and inclusive of 23 frames per second and 120 frames per second.

The Boris and Natasha RED ONE cameras embodied these limitations for the reasons stated at claim limitations [1.3.4], [1.6.1], [1.6.2] and [1.7].

12. Claim 12

Claim 12 recites the following limitations:

[12.0] A video camera according to claim 1 wherein the image sensor is configured to output the raw mosaiced image data at a resolution that is one of 2 k, 4 k, and 4.5 k and at a frame rate falling within a range between and inclusive of 23 and 120 frames per second,

[12.1] wherein the compression module is configured to compress the processed image data with a Huffman compression technique into compressed processed image data

[12.2] such that the compressed processed image data can be decompressed and demosaiced into a substantially visually lossless image having a resolution that is one of 2 k, 4 k, and 4.5 k,

[12.3] and wherein the memory device receives the compressed processed image data at a rate falling within a range between and inclusive of 23 frames per second and 120 frames per second.

The Boris and Natasha RED ONE cameras embodied these limitations for the reasons stated at claim limitations [1.3.4], [1.6.1], [1.6.2], and [1.7].

13. Claim 13

Claim 13 recites:

[13.0] A video camera according to claim 1 wherein the memory device is sufficiently large to store image data from the compression module corresponding to at least about 30 minutes of video at 12 mega pixel

resolution, 12-bit color resolution, and at 60 frames per second.

Petitioner contends that this limitation requires “a memory device with a capacity of at least 324 gigabytes.” Pet. at 9-10, 70-71. At the March 2007 testing of Boris, and on the “Crossing the Line” shoot, Boris and Natasha utilized G-Tech memory drives. The G-Tech memory drives came in either 320 and 500 gigabyte sizes, both of which were compatible with Boris and Natasha. Ex. 2017 (Land) ¶ 8.

14. Claim 14

Claim 14 requires “[14.0] A video camera according to claim 1 wherein the image sensor is a CMOS sensor.”

The Boris and Natasha RED ONE cameras embodied this limitation for the reasons stated at claim limitation [1.3.3].

15. Method Claims 15-29

Claims 15-29 are directed towards methods of recording motion video with a camera, and generally track the limitations recited in claims 1-14 directed towards a video camera. Thus, the evidence of reduction to practice of method claims 15-29 is generally the same as the evidence discussed above with respect to claims 1-14. The chart below summarizes this evidence:

U.S. Patent 9,230,299	
Claim	Record Citation
<p>[15.0] A method of recording motion video with a camera, the method comprising:</p> <p>[15.1.0] receiving light with an image sensor of a camera,</p>	<p><i>See</i> evidence cited <i>supra</i> at claim limitations [1.0] - [1.1].</p>
<p>[15.1.1] the image sensor comprising first, second, and third pluralities of light sensitive devices arranged with respect to one another in a plane defined by the image sensor</p> <p>[15.1.2] such that the first, second, and third pluralities of light sensitive devices are intermingled, defining an intermingled pattern,</p> <p>[15.1.3] the first, second, and third pluralities of light sensitive devices being configured to detect first, second,</p>	<p><i>See</i> evidence cited <i>supra</i> at claim limitations [1.3.0] - [1.3.2].</p>

U.S. Patent 9,230,299	
Claim	Record Citation
and third colors, respectively, the first, second, and third colors being different from each other;	
[15.2] converting the light received by the image sensor into mosaiced image data at a resolution of at least 2 k and at a frame rate of at least about 23 frames per second, the mosaiced image data comprising one data value for each of the light sensitive devices included in the first, second, and third pluralities of light sensitive devices;	<i>See</i> evidence cited <i>supra</i> at claim limitations [1.3.3] - [1.3.4].
[15.3.0] with electronics of the camera, processing the mosaiced image data from the image sensor and outputting processed image data based on the mosaiced image data from the image	<i>See</i> evidence cited <i>supra</i> at claim limitations [1.4] - [1.5.2].

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Claim	Record Citation
sensor, [15.3.1] the processed image data including less than three data values for each of the light sensitive devices included in the first, second, and third pluralities of light sensitive devices;	

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Claim	Record Citation
<p>[15.4.0] with electronics of the camera, compressing the processed image data with a Huffman compression technique into compressed processed image data [15.4.1] such that the compressed processed image data can be decompressed and demosaiced into a substantially visually lossless image of at least 2 k resolution; and</p> <p>[15.5] recording the compressed processed image data onto a memory device of the camera at a rate of at least about 23 frames per second.</p>	<p><i>See</i> evidence cited <i>supra</i> at claim limitations [1.2], [1.6.0] - [1.7].</p>
<p>[16.0] A method according to claim 15 wherein said converting comprises converting the light received by the image sensor into mosaiced image data</p>	<p><i>See</i> evidence cited <i>supra</i> at claim limitations [1.3.3], [2.0] - [2.2].</p>

U.S. Patent 9,230,299	
Claim	Record Citation
<p>at a resolution of at least 2 k and at a frame rate of at least 23 frames per second,</p> <p>[16.1] wherein the compressed processed image data can be decompressed and demosaiced into a visually lossless image of at least 2 k resolution,</p> <p>[16.2] and wherein said recording comprises recording the compressed processed image data onto a memory device of the camera at a rate of at least 23 frames per second.</p>	
<p>[17.0] A method according to claim 15 wherein said converting comprises converting the light received by the image sensor into mosaiced image data</p>	<p><i>See</i> evidence cited <i>supra</i> at claim limitations [1.3.3], [3.0] - [3.1].</p>

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Claim	Record Citation
<p>at a resolution of at least 4 k,</p> <p>[17.1] and the compressed processed image data can be decompressed and demosaiced into a substantially visually lossless image of at least 4 k resolution.</p>	
<p>[18.0] A method according to claim 15 wherein said converting comprises converting the light received by the image sensor into mosaiced image data at a resolution of at least 4 k and at a frame rate of at least 23 frames per second,</p> <p>[18.1] wherein the compressed processed image data can be decompressed and demosaiced into a visually lossless image of at least 4 k resolution,</p>	<p><i>See</i> evidence cited <i>supra</i> at claim limitations [1.3.3], [4.0] - [4.2].</p>

U.S. Patent 9,230,299	
Claim	Record Citation
[18.2] and wherein and said recording comprises recording the compressed processed image data onto a memory device of the camera at a rate of at least 23 frames per second.	
<p>[19.0] A method according to claim 15 wherein the one data value for each of the first plurality of light sensitive devices is representative of light of only the first color,</p> <p>[19.1] the one data value for each of the second plurality of light sensitive devices is representative of light of only the second color,</p> <p>[19.2] and the one data value for each of the third plurality of light sensitive devices is representative of only the</p>	See evidence cited <i>supra</i> at claim limitations [5.0] - [5.1].

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Claim	Record Citation
third color, [19.3] and wherein the processed image data does not include separate data values for the first, second, and third colors for each of the light sensitive devices.	
[20.0] A method according to claim 15 wherein said recording comprises recording the compressed processed image data onto a memory device disposed within a portable housing of the camera.	<i>See infra</i> Section III.B.16.
[21.0] A method according to claim 15 wherein said recording comprises recording the compressed processed image data onto a memory device supported on the outside of a portable	<i>See</i> evidence cited <i>supra</i> at claim limitation [7.0].

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Claim	Record Citation
housing of the camera.	
<p>[22.0] A method according to claim 15 additionally comprising: receiving the compressed processed image data from the memory device with a playback module implemented in the electronics of the camera;</p> <p>[22.1] and decompressing and demosaicing the compressed processed image data into demosaiced image data that includes three data values for each of the light sensitive devices included in the first, second, and third pluralities of light sensitive devices.</p>	See <i>infra</i> Section III.B.16.
<p>[23.0] A method according to claim 15 wherein the electronics comprise a compression chip and said compressing</p>	See evidence cited <i>supra</i> at claim limitation [9.0].

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Claim	Record Citation
is done using the compression chip.	
[24.0] A method according to claim 15 wherein the mosaiced image data is raw mosaiced image data.	<i>See</i> evidence cited <i>supra</i> at claim limitation [1.3.3].
[25.0] A method according to claim 15 wherein said processing the image data comprises processing the mosaiced image data at least in part by applying a pre-emphasis function to the mosaiced image data, wherein the application of the pre-emphasis function increases data values of the mosaiced image data corresponding to relatively dark image regions and decreases data values of the mosaiced image data corresponding to relatively bright image regions.	<i>See</i> evidence cited <i>supra</i> at claim limitation [10.0].
[26.0] A method according to claim 15	<i>See</i> evidence cited <i>supra</i> at claim

U.S. Patent 9,230,299	
Claim	Record Citation
<p>wherein said converting comprises converting the light received by the image sensor into mosaiced image data at a resolution falling within a range between and inclusive of 2 k and 4.5 k and at a frame rate falling within a range between and inclusive of 23 and 120 frames per second,</p> <p>[26.1] wherein said compressing comprises compressing the processed image data with a Huffman compression technique into compressed processed image data</p> <p>[26.2] such that the compressed processed image data can be decompressed and demosaiced into a substantially visually lossless image</p>	<p>limitations [11.0] - [11.3].</p>

U.S. Patent 9,230,299	
Claim	Record Citation
having a resolution falling within a range between and inclusive of 2 k and 4.5 k resolution.	
<p>[27.0] A method according to claim 15 wherein said converting comprises converting the light received by the image sensor into mosaiced image data at a resolution that is one of 2 k, 4 k, and 4.5 k and at a frame rate falling within a range between and inclusive of 23 and 120 frames per second,</p> <p>[27.1] wherein said compressing comprises compressing the processed image data with a Huffman compression technique into compressed processed image data</p> <p>[27.2] such that the compressed</p>	<p><i>See</i> evidence cited <i>supra</i> at claim limitations [12.0] - [12.3].</p>

U.S. Patent 9,230,299	
Claim	Record Citation
processed image data can be decompressed and demosaiced into a substantially visually lossless image having a resolution that is one of 2 k, 4 k, and 4.5 k.	
[28.0] A method according to claim 15 wherein the memory device is sufficiently large to store image data from the compression module corresponding to at least about 30 minutes of video at 12 megapixel resolution, 12-bit color resolution, and at 60 frames per second.	<i>See</i> evidence cited <i>supra</i> at claim limitation [13.0].
[29.0] A method according to claim 15 wherein the image sensor is a CMOS sensor.	<i>See</i> evidence cited <i>supra</i> at claim limitation [14.0].

16. Institution Should Not Be Granted On The Basis Of Dependent Claims 6, 8, 20 and 22

Dependent claim 6, 8, 20 and 22, are the only four challenged claims – out of 29 challenged claims – for which Patent Owner does not present evidence herein of a reduction to practice before April 13, 2007. These four dependent claims are challenged in Ground 1. Pet. at 10-11.

Dependent claims 6 and 20 relate to an embodiment where the memory device is disposed within the housing of the camera. Although this structural feature was not incorporated in Boris or Natasha, it reflects a well-known design choice. Indeed, RED had already confirmed by at least January 29, 2007 that an on-board compact flash memory module would work, and planned to have that feature implemented after NAB 2007. Ex. 2017 (Land) ¶¶ 12-13; Exs. 2018, 2020.

Dependent claims 8 and 22 relate to a module on the camera where the recorded video can be played back through the camera itself. Like the subject matter of claims 6 and 20, the subject matter of claims 8 and 22, relating to on-board playback capability, involved a design implementation that RED made available on subsequent RED ONE models. Ex. 2017 (Land) ¶ 12.

It would not be an efficient use of the Board's time and resources to institute a full trial on this record with respect to all 29 claims and all three grounds, solely to confirm that these dependent claims were reduced to practice with reasonably

continuous diligence. Thus, in view of the Board's discretion and the evidence and arguments presented in this Preliminary Response, Patent Owner respectfully requests that the Board deny institution on this record as to all challenged claims in the interest of preserving the Board's time and resources. *See, e.g., Deeper, UAB v. Vexilar, Inc.*, Case IPR2018-01310, Paper No. 7 at 41-43 (P.T.A.B. Jan. 24, 2019); *Chevron Oronite Co. v. Infineum USA L.P.*, Case IPR2018-00923, Paper No. 9 at 10-11 (P.T.A.B. Nov. 7, 2018).

C. Petitioner Has Not Satisfied Its *Prima Facie* Showing On Obviousness

Even if Presler qualified as prior art to the challenged claims, Petitioner has not satisfied its *prima facie* showing that Presler combined with Molgaard renders the challenged claims obvious. According to Petitioner's obviousness contentions, Presler alone discloses only 4 of 16 limitations in independent claim 1, and ***none*** of the 11 limitations in independent Claim 15, of the '299 patent. Pet. at 17-43, 56-60. Thus, Petitioner relies on a combination with Molgaard to satisfy most of the independent claim limitations. *Id.* Because all three Grounds rely on this combination, the entire petition hinges on Petitioner's contention that a person of ordinary skill in the art would look to Molgaard to address the many deficiencies in Presler. Petitioner fails to support this contention.

Petitioner must "explain why a person of ordinary skill in the art would have combined elements from specific references in the way the claimed invention does."

ActiveVideo Networks, Inc. v. Verizon Commc’n, Inc., 694 F.3d 1312, 1328 (Fed. Cir. 2012). Moreover, “[a]lthough the *KSR* test is flexible, the Board ‘must still be careful not to allow hindsight reconstruction of references . . . without any explanation as to *how* or *why* the references would be combined to produce the claimed invention.’” *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016) (emphasis original) (quoting *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1368 (Fed. Cir. 2012)). But Petitioner fails to satisfy this threshold showing of how or why Molgaard would be used as a reference to achieve the claimed digital video camera, or one having motion picture quality, resolution and frame rates.

Presler states that its invention “is related, in general, to a digital cinema camera system.” Ex. 1005 at 1:17-18. Additionally, Petitioner admits that Presler relates to a digital camera that records “at film or video rates for HD, 2K and 4K, cinema quality production.” Pet. at 12. With regard to Molgaard, while Petitioner states that it pertains to “digital image data,” Petitioner offers no evidence that this “digital image data” refers to digital motion video data at all, let alone motion video data achieving motion picture quality, resolution and frame rates. Pet. at 16. On the contrary, Molgaard’s disclosure never discusses digital motion video camera applications. Ex. 1006. Indeed, the words “video,” “motion” or “cinema” do not appear anywhere in Molgaard’s disclosure. Instead, the “Summary of the Invention”

states “[t]he *professional photographer* requires total control of the processing of image data . . .” Ex. 1006 at 2:47-49 (emphasis added).

Thus, Molgaard correlates its use of the term “image data” with that generated by still photography, not motion videography – let alone motion videography achieving cinema quality, resolution and frame rate. Molgaard also describes a “Black Calibration” stage that “is particular[ly] important in *digital still imaging* . . .” Ex. 1006 at 9:20-25 (emphasis added); *see also id.* at 2:40 (emphasizing the importance of “mak[ing] the camera ready for *the next exposure* as fast as possible”) (emphasis added).

In discussing the “Reasons to Combine,” Petitioner provides no evidence supporting the combination of Presler and Molgaard. Pet. at 17. Rather, Petitioner states that “[f]urther explanation of the reasons a POSTIA would have combined Presler with Molgaard [] to achieve the claimed limitations is found below in the element-by-element analysis.” *Id.* However, none of the subsequent “element-by-element analysis” provides evidence that Molgaard relates to digital motion video data or that its cited techniques would successfully work “at film or video rates.” Pet. at 17-43. Petitioner’s analysis merely assumes that Molgaard’s techniques apply to Presler’s disclosed cinema video camera. *Id.*

Petitioner’s declarant, Mr. Reader, offers no help. Despite relying on the Molgaard combination to satisfy almost all independent claim limitations,

Mr. Reader’s “Summary of Molgaard” offers no evidence that Molgaard relates to motion video data, let alone cinema-quality motion video data. Ex. 1003 ¶¶ 59-62. Mr. Reader purports to address this issue in his declaration under the heading “Reasons to Combine Presler, Molgaard, and Chui.” Ex. 1003 ¶¶ 64-73. In particular, in paragraph 72, Mr. Reader states that “a POSITA would have recognized that Molgaard’s data processing techniques would have been ideally suited for meeting the high-speed data requirements of Presler’s camera. *See* Ex. 1005, 4:33-39.” *Id.* ¶ 72. Mr. Reader’s only citation to support this statement is to Exhibit 1005, which is the Presler reference. Thus, Mr. Reader cites nothing in Molgaard to support this statement.

Mr. Reader next states that “For example, Molgaard’s compression algorithm ‘enables very fast subsampling of an already compressed image’—such as imaging data in Presler’s camera—to ‘improve performance.’ *See* Ex. 1005, 4:33-39; Ex 1006, Abstract.” Ex. 1003 ¶ 72. Mr. Reader only cites Molgaard’s Abstract to support this statement. However, nothing in Molgaard’s Abstract indicates its disclosed compression algorithms would work successfully on the motion video image data in Presler’s video camera.

Mr. Reader then states:

Molgaard also states that “[t]he preconditioning stage conditions the incoming image data in a way to allow the following stages to perform

at their best, thereby creating optimum compression ratio and image quality.” Ex. 1006, 9:45-58. A POSITA would have thus been motivated to implement Molgaard’s efficient data compression techniques so as to reduce storage and transmission requirements of Presler’s video camera. *See* Ex. 1005, 5:57-66; Ex. 1006, 14:32-45. Therefore, it would have been obvious to combine the teachings of Presler and Molgaard.

Ex. 1003 ¶ 72.

While Mr. Reader cites Molgaard at 9:45-58 and 14:32-45, neither passage indicates that it applies to motion video image data, or indicates its teachings would be successful in a motion video camera environment. Mr. Reader only seems to assume that Molgaard’s teachings could apply to Presler. Thus, Mr. Reader has not supported his final contention that Molgaard would “reduce storage and transmission requirements of Presler’s *video* camera.” Ex. 1003 ¶ 72 (emphasis added). Consequently, Mr. Reader has not supported his conclusion that “it would have been obvious to combine the teachings of Presler and Molgaard.” *Id.*

Thus, Mr. Reader offers no evidence why a POSITA would look to Molgaard to solve the motion video camera deficiencies of Presler, or how the 2004-era algorithms in Molgaard could successfully overcome the many deficiencies in Presler’s “digital cinema camera system.” Like the Petition itself, Mr. Reader offers conclusory statements, without supporting explanation, that Molgaard’s disclosure

somehow could successfully apply to digital motion video data having motion-picture quality, resolution and frame rate. *Id.*

Mr. Reader's failure to explain how or why Molgaard would be combined with Presler is also telling with regard to the "substantially visually lossless" limitation in each independent claim of the '299 patent. Petitioner and Mr. Reader rely on a lone statement in Molgaard's "Summary of the Invention" section to satisfy that limitation. *See* Pet. at 42-43, 59-60; Ex. 1003 at 61-62, 63-64, 67, 68, 78, 79, 82, 83, 84, 85-86, 90, 91. However, the statement in Molgaard upon which they rely contemplates a compression scheme not called for in the claims of the '299 patent. In particular, the statement in Molgaard reads as follows:

Lossy compression gives even smaller compressed image data files, and allows for even faster and cheaper handling of files[,] but also deteriorates the quality of the decompressed image. In the present invention, ***near-lossless compression*** is implemented using a gamma function to provide a compression that is ***visually lossless*** as it only affects image data in the same manner as the later image postprocessing, e.g. in relation to presenting recorded images on a monitor or a printout.

Ex. 1006 at 2:59-66 (emphasis added).

Thus, Molgaard attributes "visually lossless" to its teaching of "near-lossless compression." *Id.* In contrast, the independent claims of the '299 patent require lossless (Huffman) compression. Ex. 1001 at [1.6.1] and [15.4.0]. Moreover,

Molgaard clearly distinguishes between lossy, lossless and near-lossless compression, and treats them as separate concepts. *See, e.g.*, Ex. 1006 at 1:6-8, 3:4-7. However, neither Mr. Reader nor Petitioner ever address the significance of Molgaard’s “near-lossless” compression scheme, why a POSITA would look to that scheme, or how it would work with Presler to achieve the motion-picture quality, resolution and frame rate of the video cameras of the ’299 patent that require Huffman (lossless) compression.

“[T]he U.S. Court of Appeals for the Federal Circuit has made clear that a petitioner in an *inter partes* review proceeding cannot ‘satisfy its burden of proving obviousness’ by ‘employ[ing] mere conclusory statements’ and ‘must instead articulate specific reasoning, based on evidence of record’ to support an obviousness determination.” *Hyundai Motor Co. v. Blitzsafe Texas, LLC*, Case No. IPR2016-01476, Paper No. 12, at 32-36 (P.T.A.B. Jan. 24, 2017) (quoting *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016)). Thus, Petitioner has failed to make its *prima facie* showing on obviousness, and institution should be denied based on that failure alone. *See id.* at 32-36.

IV. CONCLUSION

For the foregoing reasons, the Patent Owner respectfully requests the Board deny institution.

Apple v. RED.COM
U.S. Patent No. 9,230,299 - IPR2019-01064

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: August 15, 2019

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**CERTIFICATE OF TYPE-VOLUME LIMITATIONS
UNDER 37 C.F.R. § 42.24**

Pursuant to 37 C.F.R. § 42.24(d), Counsel for Patent Owner Illumina, Inc. hereby certifies that the foregoing **PATENT OWNER RED.COM, LLC'S PRELIMINARY RESPONSE** complies with the type-volume limitation of 37 C.F.R. § 42.24(b)(1). According to Microsoft Office Word 2016's word count, this Preliminary Response contains approximately 11,766 words, exclusive of the parts exempted as provided in 37 C.F.R. § 42.24(a).

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that, pursuant to 37 C.F.R. § 42.6(e)(1) and agreement of the parties, a true and correct copy of the foregoing **PATENT OWNER RED.COM, LLC'S PRELIMINARY RESPONSE and EXHIBITS 2001-2023** is being served via email on August 15, 2019 to counsel for **Apple Inc.** at the email addresses below:

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