UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HTC CORPORATION, HTC AMERICA, INC., and
LG ELECTRONICS, INC.,
Petitioners,

v.

PARTHENON UNIFIED MEMORY
ARCHITECTURE LLC,
Patent Owner

Case IPR No.: IPR2015-01500, -1501, -01502
U.S. Patent Nos. 7,321,368, 7,777,753, & 7,542,045

REPLY DECLARATION OF HAROLD S. STONE, PH.D.

TABLE OF CONTENTS

I, Harold S. Stone, Ph.D., declare as follows:

I. INTRODUCTION

1. I am the Harold S. Stone who has previously submitted declarations in these three proceedings (Exs. 1030 in each proceeding). The terms of my engagement, my background, qualifications and prior testimony, and the legal standards and claim constructions I am applying are set forth in my previous declarations. I offer this declaration in reply to the testimony of Prof. Thornton provided in each proceeding (Exs. 2009). Because Prof. Thornton's testimony and the issues it raises are substantially identical between proceedings, I intend to reply to his testimony in each proceeding in parallel. In forming my opinion, I have considered the materials noted in my previous declarations in these proceedings, as well as the following additional materials:

- Ex. 1033 — U.S. Patent No. 5,682,484 ("Lambrecht '484")
- Ex. 1034 — U.S. Patent No. 5,375,068 ("Palmer")
- Ex. 1035 — U.S. Patent No. 5,557,538 ("Retter")
- Ex. 1036 — K. Konstantinides and V. Bhaskaran, "Recent Developements in the Design ofImage and Video Processing ICs," Chapter 2 - VLSI Signal Processing Technololgy, Kluwer Academic Press, 1994
- Ex. 1037 — Deposition Transcript of Dr. Mitchell A. Thornton, Ph.D. (June 17, 2016)

- Ex. 1038 — Information technology – Generic Coding of Moving Pictures and Associated Audio Information: Systems, ISO/IEC 13818-1:1996 (1996) ("MPEG-2 Standard")

- Ex. 1039 — Srinath V. Ramaswamy and Gerald D. Miller, "Efficient Implementation of the Two Dimensional Discrete Cosine Transform for Image Coding applications on the DSP96002 Processor," Proc. of the Midwest Conf. on Circuits and Systems, (IEEE 1993)

II. SHARED MEMORY V. DEDICATED MEMORY

2. Prof. Thornton writes:

> 29. Typically, a decoder requires its own dedicated memory. For instance, traditional MPEG decoders require a 2 Mbyte dedicated memory which is utilized during the decoding process. This dedicated memory is necessary to allow the decoder to decode images in real-time without dropping frames which would result in a deterioration of the video quality at the receiver. This prior art implementation is shown, for example, in Figure 1c of the `368 Patent.
>
> [IPR2015-01500, Ex. 2009 at ¶29; *see also* IPR2015-01501, Ex. 2009 at ¶29; IPR2015-01502, Ex. 2009 at ¶29].

3. There is no support for this opinion. On the contrary, the Petitioners have cited to various prior art references that disclose MPEG decoders based on shared memory and which do not require dedicated memory. [*See, e.g.*, S. Rathnam *et al*., "An Architectural Overview of the Programmable Multimedia Processor, TM-1," IEEE Proceedings of COMPCON '96, pp. 319-326 (1996)

("*Rathnam*") (Ex. 1005); U.S. Patent No. 5,774,676, Figs 3 & 4 ("*Stearns*") (Ex, 1007); U.S. Patent No. 5,797,028 ("*Gulick 028*") (Ex. 1023); U.S. Patent No. 5,432,900 ("*Rhodes*") (Ex. 1028); *see also* U.S. Patent No. 5,682,484 ("*Lambrecht '484*") (Ex. 1032).]

III. BOWES AND VIDEO DECODING

4. Prof. Thornton also writes:

> The word "video" is only mentioned four times in Bowes. [Bowes, 1:34; 1:37; 1:41; 6:16]. The first three times the term "video" is used in conjunction with a description of related art and the fourth time, the term "video" is used in reference to a NuBus peripheral bus video controller and not in reference to a processing application. The words "decode" or "decoding" never appear in Bowes.
>
> 44. Instead, Bowes specifically teaches that the DSP in the preferred embodiment is suitable for audio processing, image signal processing, speech processing, and modem emulation. [Bowes Pat., 1:48-49; 6:32-37]. Bowes does not state that the DSP is suitable for video compression and decompression applications such as the implementations of the MPEG Standard. A POSA would recognize that audio processing, speech processing and modem emulation are clearly distinct from video compression and decompression. The same is true with respect to "image processing."

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