UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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LG ELECTRONICS, INC.

Petitioner

v.

CONSTELLATION DESIGNS, LLC

Patent Owner

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US Patent No. 10,693,700

Issue Date: June 23, 2020

Title: Receivers Incorporating Non-Uniform Multidimensional Constellations
and Code Rate Pairs

Inter Partes Review No.: IPR2023-00319

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DECLARATION OF DR. BERTRAND HOCHWALD

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I, Dr. Bertrand Hochwald, declare as follows:

I. INTRODUCTION

[0001]   I have been retained by LG Electronics, Inc. ("Petitioner" or "LG") to serve as an independent expert consultant in the *Inter Partes* review (IPR) proceedings regarding U.S. Patent No. 10,693,700 (the "'700 Patent" or LGE1001). I have been asked to consider the validity of claims 2-3, 5, 12-13, 15, 22-23, and 25 of the '700 Patent (the "Challenged Claims"). My opinions are set forth below.

[0002]   I am being compensated at my normal rate of $675/hour for all services rendered. My compensation is not contingent upon the results of my study, the substance of my opinions, or the outcome of any proceeding involving the challenged claims. I have no financial interest in the outcome of this matter or on the pending litigation between Petitioner and Patent Owner.

[0003]   My analysis of the materials produced in this proceeding is ongoing and I will continue to review any new material that is provided. This declaration is indicative of only those opinions that I have formed to date. I reserve the right to amend, revise, and/or supplement my opinions stated herein based on any new information that may become available to me or my continuing analysis of the materials already provided.

II. QUALIFICATIONS

[0004] My qualifications for forming the opinions in this report are summarized here and also noted in my Curriculum Vitae ("CV"), which is submitted as Appendix A.

[0005] In 1995, I received a Ph.D. in Electrical Engineering from Yale University. My Ph.D. work involved the analysis and processing of electromagnetic and audio signals for the estimation of the location of electromagnetic and audio sources. In 1993, I received an M.A. in Statistics from Yale University. My primary area of study was Signal Processing and Communications. I received an M.S. in Electrical Engineering from Duke University in 1986, and a B.S. in Engineering from Swarthmore College in 1984.

[0006] I have twenty-six years of combined industry and academic experience in the research and design of hardware, software, and systems for various technologies, including electronic devices, sensors, signal and image processing, networking and wireless communications. I have worked in various industry jobs, including at the Department of Defense, Bell Labs, and a start-up in California before joining the University of Notre Dame in 2011. As I explain below, much of my work has been in the general areas of

audio/video signal processing and communications.

[0007]   My most recent appointment, starting in 2011, is with the University of Notre Dame, where I am currently a Freimann Chaired Professor of Electrical Engineering. I have taught both graduate and undergraduate classes in signal processing, information theory, communications, and in systems theory. I have also taught courses in electronics, analog and digital signal sensing, processing, computation, and electronic forms of wireline and wireless networking and communications. My primary areas of research include such systems, sensors, communication system design and signal processing. I advise graduate students who are attaining Ph.D. degrees through research and coursework. My research work now includes processing of high data rate signals (similar to those used to transmit and receive coded signals) in communication systems.

[0008]   An example of my current work at the University includes a project that I lead called RadioHound distributed spectrum sensor system for remote monitoring using radio signals (https://wireless.nd.edu/research/radiohound-distributed-spectrum-sensing/), which is a multi-year effort involving several students, faculty, and technicians. The RadioHound system captures data from hundreds of sensors and displays it in a real-time setting for human

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