UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Intel Corporation
Petitioner

v.

ParkerVision, Inc.
Patent Owner

Case IPR2020-01265

REPLY DECLARATION OF VIVEK SUBRAMANIAN, PH.D.

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I, Vivek Subramanian, declare as follows:

I. INTRODUCTION

1. I am the same Vivek Subramanian who submitted a prior Declaration in this matter, which I understand was filed as Exhibit 1002 on July 13, 2020. I am a Professor of Microtechnology at the École polytechnique fédérale de Lausanne (EPFL) (also known as the Swiss Federal Institute of Technology in Lausanne) in Switzerland. Until recently, I was also a professor of Electrical Engineering and Computer Sciences at the University of California, Berkeley. As of July 1, 2020, I have become an adjunct professor at UC Berkeley upon completion of my move to EPFL.

2. My background and qualifications remain as stated in paragraphs 1-12 and Appendix A of my first Declaration (Ex. 1002).

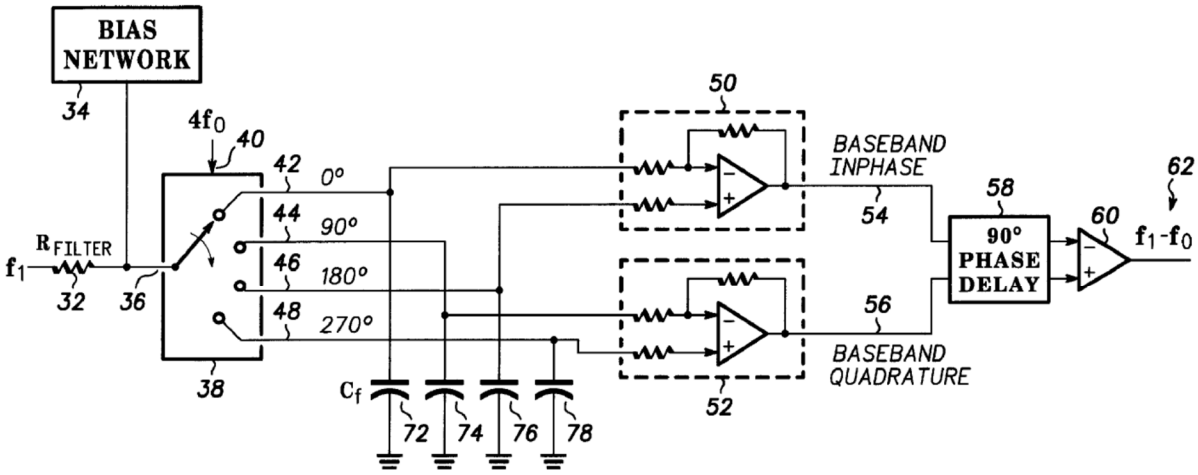
3. Since my prior Declarations, I have reviewed Patent Owner's Response ("POR"), the Declaration of Dr. Michael Steer (Ex. 2021), and the exhibits referenced in this Declaration.

4. I confirm that the technical analysis included in my first Declaration (Ex. 1002) remains true to the best of my knowledge, as does my understanding of the relevant legal principles stated in paragraphs 15-24 of my first Declaration.

II. ANALYSIS OF THE AMOUNT OF ENERGY STORED BY TAYLOE'S CAPACITORS

5. I understand that both Intel and the Patent Owner have proposed constructions for the "storage element" term recited in claim 3 of the '444 patent. Intel proposes construing the "storage element" term as "an element that stores a nonnegligible amount of energy from an input electromagnetic (EM) signal." The Patent Owner proposes construing the term as "an element of an energy transfer system that stores nonnegligible amounts of energy from an input electromagnetic signal." Both Intel and the Patent Owner thus agree that a "storage element" must "store[] non-negligible amounts of energy from an input electromagnetic signal."

6. Tayloe's capacitors 72, 74, 76, and 78 shown in Fig. 3 (reproduced below) and the capacitors disclosed in its other embodiments store non-negligible amounts of energy from an input electromagnetic signal.



30 FIG. 3

(Ex. 1004-Tayloe, Fig. 3; *see also id.*, Figs. 5-7 and corresponding description of capacitors in Figs. 3, 5-7.)

7. By way of background, the amount of energy that a capacitor stores equals the amount of work needed to charge the capacitor to a particular voltage level. This amount of stored energy can be calculated with the well-known mathematical expression $E = \frac{1}{2}CV^2$, where E denotes the amount of energy stored by the capacitor, V denotes the voltage across the capacitor, and C denotes the capacitance of the capacitor. Thus, a large capacitor has the capacity to store more energy than a smaller capacitor when charged to a given voltage value.

8. Tayloe's capacitors 72, 74, 76, and 78 in Fig. 3 (and the capacitors shown in Figs. 5-7) store non-negligible amounts of energy from the input signal.

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