UNITED STATES PATENT AND TRADEMARK OFFICE

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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Apple Inc.,
Petitioner

v.

California Institute of Technology,
Patent Owner.

Case IPR2017-00423

**DECLARATION OF JAMES A. DAVIS, PH.D.
REGARDING U.S. PATENT NO. 7,916,781
CLAIMS 13-22**

**TABLE OF CONTENTS**

I, James A. Davis, Ph.D., declare as follows:

1.      My name is James A. Davis.

## II.      BACKGROUND

2.      I am a Professor of Mathematics at the University of Richmond in Richmond, Virginia.

3.      I received a B.S. in Mathematics (with honors) from Lafayette College in 1983 and an M.S. and Ph.D. in Mathematics from the University of Virginia in 1985 and 1987, respectively.

4.      After receiving my doctorate, I taught for one year at Lafayette College before accepting a position at the University of Richmond as an Assistant Professor of Mathematics in 1988. I became an Associate Professor of Mathematics in 1994 and a Full Professor of Mathematics in 2001.

5.      Since joining the faculty of the University of Richmond in 1988, I have been engaged in research in Coding Theory, Algebra, and Combinatorics. My research has appeared in journals such as IEEE Transactions on Information Theory, the Journal of Combinatorial Theory Series A, Designs, Codes, and Cryptography, the Proceedings of the American Mathematical Society, and the Journal of Algebra.

6.      I have made several major contributions to the field of coding theory in wireless communication and sequence design. I co-discovered the connection

between sequences with good power control and Reed-Muller codes, an important step in making OFDM communication practical. I co-discovered a technique for constructing difference sets that has been applied to constructions of bent functions. I co-wrote the paper on the non-existence of Barker arrays.

7.    I was a co-Principal Investigator of a $1.5 million National Science Foundation grant designed to engage undergraduates in long-term research projects in mathematics.

8.    I have taught mathematics courses in Calculus, Statistics, Linear Algebra, Abstract Algebra, Coding Theory, and Cryptography, among others. I have directed 12 honors projects and 76 summer research experiences for undergraduates in the general area of Coding Theory and Combinatorics.

9.    I spent two years (academic years 1995-96 and 2000-01) working at Hewlett-Packard Laboratories in Bristol, England. I was in a communications lab during this time, an industrial research lab focused on applications of Coding Theory to wireless communication and storage devices. I am co-inventor on 16 patents based on my work during this time.

10.    I served as Chair of the Department of Mathematics and Computer Science 1997-2000.

11.     I have authored or co-authored over 50 peer-reviewed academic

publications in the fields of Coding Theory, Combinatorics, Finite Geometry, and

Algebra.

12.     A copy of my curriculum vitae is attached as Appendix A.

13.     I have reviewed the specification and claims of U.S. Patent No.

7,916,781 (the "'781 patent"; Ex. 1101). I have been informed that the '781 patent

claims priority to a provisional application filed on May 18, 2000, and to U.S.

application Ser. No. 09/922,852, filed on Aug. 18, 2000.

14.     I have also reviewed the following references, all of which I

understand to be prior art to the '781 patent:

- L. Ping, W. K. Leung, N. Phamdo, "Low Density Parity Check Codes with Semi-random Parity Check Matrix." *Electron. Letters*, Vol. 35, No. 1, pp. 38-39, January 7, 1999 ("Ping"; Ex. 1103.)

- D. J. C. MacKay, S. T. Wilson, and M. C. Davey, "Comparison of constructions of irregular Gallager codes," *IEEE Trans. Commun.*, Vol. 47, No. 10, pp. 1449-54, October 1999 ("MacKay"; Ex. 1102.)

- U.S. Patent No. 4,271,520 (1981) ("Coombes"; Ex. 1118.)

15.     I am being compensated at my normal consulting rate for my work.

16.     My compensation is not dependent on and in no way affects the

substance of my statements in this Declaration.

17.     I have no financial interest in Petitioners. I similarly have no financial

interest in the '781 patent.

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