

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Apple Inc.,
Petitioner

v.

California Institute of Technology,
Patent Owner.

Case TBD

**DECLARATION OF JAMES A. DAVIS, PH.D.
REGARDING U.S. PATENT NO. 7,116,710
CLAIMS 1-8, 10-17, and 19-33**

TABLE OF CONTENTS

	Page
II. BACKGROUND	1
III. LEGAL PRINCIPLES	4
IV. OVERVIEW OF THE TECHNOLOGY	6
A. Error-Correcting Codes in General	6
B. Coding Rate	9
C. Performance of Error-Correcting Codes	10
D. LDPC Codes, Turbo Codes, and Repeat-Accumulate Codes	11
E. Mathematical Representations of Error-Correcting Codes	16
F. Irregularity	22
V. Overview Of Primary Prior Art References	23
A. Frey	23
B. Frey Slides	27
C. Divsalar	29
D. Luby	32
E. Luby97	35
F. Pfister Slides	36
VI. PERSON OF ORDINARY SKILL IN THE ART	37
VII. OVERVIEW OF THE '710 PATENT	37
VIII. CLAIM CONSTRUCTION	39
A. “close to one” (Claims 1 and 3)	39
IX. THE CHALLENGED CLAIMS ARE INVALID	40
A. Ground 1: Claims 1 and 3 Are Anticipated by Frey	40
B. Ground 2: Claims 1-8 and 11-14 Are Obvious over Divsalar in View of Frey	49
C. Ground 3: Claims 15-17, 19-22, and 24-33 Are Obvious over Divsalar in View of Frey and also in view of Luby97	73
D. Ground 4: Claim 10 is Obvious in View of Divsalar and Frey, Also in View of Pfister	94

E.	Ground 5: Claim 23 is Obvious in View of Divsalar, Frey, and Luby97, Also in View of Pfister.....	96
F.	Ground 6: Claims 1 and 3 Are Anticipated by the Frey Slides	96
G.	Ground 7: Claims 1-8 and 11-14 are Obvious over Divsalar in View of the Frey Slides.....	105
H.	Ground 8: Claims 15-17, 19-22, and 24-33 Are Obvious over Divsalar in View of the Frey Slides and also in view of Luby97.....	125
I.	Ground 9: Claim 10 is Obvious in View of Divsalar and the Frey Slides, Also in View of Pfister.....	144
J.	Ground 10: Claim 23 is Obvious in View of Divsalar, the Frey Slides, and Luby97, also in View of Pfister.....	146
K.	Ground 11: Claims 1-8 and 11-14 are Obvious over Divsalar in view of Luby	146
L.	Ground 12: Claims 15-17, 19-22, and 24-33 Are Obvious in view of Divsalar and Luby, also in view of Luby97.....	165
M.	Ground 13: Claim 10 is Obvious Over Divsalar and in View of Luby, and Also in View of Pfister.....	180
N.	Ground 14: Claim 23 is Obvious Over Divsalar, Luby, and Luby97, also in View of Pfister	183
X.	PUBLICATION STATUS OF LUBY97	183
XI.	AVAILABILITY FOR CROSS-EXAMINATION	184
XII.	RIGHT TO SUPPLEMENT	185
XIII.	JURAT.....	185

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.

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.