UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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AMERICAN EXPRESS COMPANY, AMERICAN EXPRESS TRAVEL RELATED SERVICES COMPANY, INC., COMPASS BANK, DISCOVER FINANCIAL SERVICES, DISCOVER BANK, DISCOVER PRODUCTS INC., NAVY FEDERAL CREDIT UNION, AND STATE FARM MUTUAL AUTOMOBILE INSURANCE COMPANY

Petitioner,

v.

MAXIM INTEGRATED PRODUCTS, INC.

Patent Owner.

Case No. To Be Assigned
Patent No. 5,940,510

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DECLARATION OF PETER ALEXANDER, PH.D.

Docket No: 1202549-0003

I, Peter Alexander, declare and state as follows:

1.   The petition names American Express Company, American Express Travel Related Services Company, Inc., Compass Bank, Discover Financial Services, Discover Bank, Discover Products Inc., Navy Credit Federal Credit Union, and State Farm Mutual Automobile Insurance Company as real parties-in interest. I have been retained by American Express Company, American Express Travel Related Services Company, Inc., Compass Bank, Discover Financial Services, Discover Bank, Discover Products Inc., Navy Credit Federal Credit Union, and State Farm Mutual Automobile Insurance Company (collectively "Petitioner") as an expert witness in this case to offer my opinions on U.S. Patent No. 5,940,510 ("'510 Patent"). I am being retained at my customary rate of $525/hour. I have no financial interest in, or affiliation with, Petitioner, real parties-in-interest, or the patent owner, which I understand to be Maxim Integrated Products, Inc. My compensation is not dependent upon the outcome of the present covered business method patent review or any related litigation proceedings.

2.   As preparation for forming opinions expressed in this declaration, I reviewed the '510 Patent prosecution history, specification, and claims, and the materials discussed below.

I.   QUALIFICATIONS

3.   My academic credentials include a Ph.D. from the Massachusetts Institute of Technology in Electrical Engineering, a Masters degree from the University of Illinois (Urbana) in Electrical Engineering, and a Bachelors degree in Electrical Engineering from the University of Canterbury (New Zealand). My Curriculum Vitae, attached separately as Ex. 1017 to the petition, lists my prior engagements where I have testified as an expert witness for at least the last 4 years, and a list of my publications authored in at least the last 10 years.

4.   My academic degrees are all in Electrical Engineering. While undertaking my Doctorate work at MIT I worked in the Research Lab. for Electronics that has for decades contributed to basic research in information theory, coding, and statistical estimation theory. My Ph.D. thesis was in the field of statistical estimation theory as applied to communications systems.

5.   As indicated in my Curriculum Vitae, my experience in computer technology design and development spans more than 35 years. I have been a designer of computer systems for processing, storage, and display of data since 1974. In the 1970s, I worked with, among others, products in Intel's various lines of microprocessors and microcontrollers. In the first few years I was a university professor teaching graduate and undergraduate electrical engineering courses - including the design and programming of computers. Along with a group of young graduate students I developed a microprocessor system for industrial control applications in 1974 using the Intel 4004 CPU chip as the base component.

6.   When I entered the computer industry in the mid-1970s I developed special software and custom hardware systems for government agencies such as the Defense Communications Agency, Naval Research Labs, and National Security Agency. For most of that period I held a Secret security clearance and programmed microprocessor computers for use in defense systems. Typically these systems were used for radar and sonar systems deployed by the military. My design efforts involved both software and computer hardware architecture and involved custom hardware implementations using commercial CPU and digital signal processing ("DSP") chips. During this phase I developed

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many systems based on commercial microprocessor and DSP chips from Motorola, Intel, and Texas Instruments.

7.   My contract work with the DSP systems developed for the National Security Agency resulted in the commercialization of a high speed computer system. During the 1980s I founded a company that sold these high performance machines as commercial products, a company called Numerix Corporation. I formulated the system design and programmed a significant portion of the application software that ran on the machines. During this decade I was also spearheading efforts to migrate the discrete integrated circuits ("IC") hardware implementations into gate arrays – a form of custom chip that was in vogue during that time period. I was the chief architect of the systems that we built and personally formulated all the key bus, memory, and processor interconnections. At that time I had roughly 20 hardware engineers and 30 software engineers reporting to me.

8.   The high-performance processor products were sold to companies like Standard Oil of Ohio in Dallas, Texas to process seismic field data collected for oil exploration as well as to US government agencies as commercial off-the-shelf products. For example, some of our systems provided processing for sonar systems used to track Soviet submarines in the Pacific Ocean. Others were used in military radar systems for missile tracking by RCA. Numerix Corporation was acquired in 1989 by a Boston company called Mercury Computer Systems that continues to sell digital signal processing solutions to US government agencies.

9.   In the mid-1990s I focused my career more on business–oriented software development. For example I directed the efforts of approximately 100 software developers and Quality Assurance personnel while employed at Platinum Software in the mid to late 1990s. The software systems were "client-server" business applications such as finance, manufacturing, and sales force automation. At that time those applications were being adapted to web server implementations in order to allow our customers to access the same content through a web browser running on a client computer.

10.   Then in the period 1999-2003 I was responsible for teams of 50 or more web site developers at companies such as CareerPath.com (now merged with the CareerBuilder.com site). As such I have had a rich and in-depth exposure to many forms of computer applications involving the display of web pages on client computers. My work in web site design led to a hands-on knowledge of cryptographic systems for secure access and user authentication. My experience in this domain results from having designed and created two different commercial web sites that required extensive engineering effort to support secure e-commerce transactions. For example while running a development team of about 15 people at InfrastructureWorld.com as Chief Technology Officer I engineered a hardened web site that provided extraordinary levels of security for the high-dollar business transactions. The web server implementations were designed to support authentication through Public Key certificates, user access control via authenticated account login, Secure Sockets Layer ("SSL") extranet connections, and document encryption.

11.   Similarly, while at Syntricity, Inc. in San Diego, CA as Vice President, Technical Operations, I designed and developed a secure Application Services Provider ("ASP") Internet system to host a hundred or so corporate customers, allowing them secure access to tools for transfer of data files and analysis of semiconductor yield data. This web site used secure FTP for high-speed data transfers, secure sockets layer ("SSL") for secure web site access, and user authentication.

12.   In addition I have served as a technical expert in several contract and patent lawsuits involving cryptographic components. Briefly, these include *Dongjin Semichem Co., Ltd. v. EmailFund,Inc.*, which involved an effort to implement wireless security software technology in handheld wireless devices. The concept was to use the Elliptic Curve Digital Signature Algorithm

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("ECDSA") to perform the functions of user authentication, non-repudiation, integrity and cryptographic primitives in a single integrated circuit that could be integrated into a smart phone. I have also contributed as a technical expert in cases such as: *Adobe Systems, Inc. v. Wowza Media Systems, Inc.* that involved Diffie-Hellman key exchange for flash media delivery; *VirnetX Inc. v. Cisco Systems, Inc. and Apple Computer, Inc.* that involved the SSL protocol, IPSec Internet packet encryption, Public Key cryptography authentication and encryption techniques using Digital Certificates; and, *Leon Stambler v. Amazon.com, Inc., et al.* that involved Point of Sale authentication systems in the early 1990s.

13.   In those efforts I frequently relied on documents referred to or directly related to those used to support this petition, namely Diffie-Hellman key exchange and the Diffie-Hellman U.S. Patent 4,200,770 from 1977 ("DH Key Exchange"), the Rivest Shamir Adleman ("RSA") U.S. patent 4,405,829, also from 1977, and numerous documents and books published by Price and Davies, the British POS terminal authentication pioneers.

14.   In summary, I believe I am qualified to testify on the subjects of secure financial transactions and the implementation of cryptographic applications such as authentication, non-repudiation, and message integrity programmed into physical devices such as smart cards and tokens using microprocessors or application specific ICs.

II.   MATERIALS CONSIDERED

15.   I have reviewed each of the following:

a.   U.S. Patent No. 5,940,510 ("the '510 Patent"), including the claims, description, and prosecution history (which are identified in the Petition respectively as Exhibits 1001 and 1002);

b.   International Patent Application Publication No. WO 1983/003018 to Cremin at al. (Ex. 1003; hereinafter "Cremin");

c.   Integrated Circuit Cards, Tags, and Tokens by P.L. Hawkes, et al. (Ex. 1004; hereinafter "Hawkes"), which includes:

   i.   *Preface* by P.L. Hawkes (hereinafter, "Hawkes Preface");

   ii.   *Chapter 1: Introduction to Integrated Circuit Cards, Tags and Tokens for Automatic Identification* by P.L. Hawkes (hereinafter, "Hawkes Chapter 1");

   iii.   *Chapter 6: Secure Transactions with an Intelligent Token* by W.L. Price and Bernard J. Chorley (hereinafter, "Hawkes Chapter 6"); and

   iv.   *Chapter 8: Cryptography and the Smart Card* by D.W. Davies (hereinafter, "Hawkes Chapter 8");

d.   U.S. Patent No. 5,210,846 to R.D. Lee (Ex. 1008; hereinafter "Lee");

e.   Rivest, et al., A method for obtaining digital signatures and public key crypto-systems, Communications of ACM, Volume 21, Number 2 (1978) (Ex. 1005; hereinafter "Rivest");

f.   Martin Marshall, Motorola Unveils Details of 68040, INFOWORLD, April 3, 1989 (Ex. 1014);

g.   Erik Sandberg-Diment, The Executive Computer; How To Improve A PC's Math Skills, THE NEW YORK TIMES, January 19, 1986 (Ex. 1015);

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<tr><td>h.</td><td>Texas Instruments, TMS7000 Family Microarchitecture User's Guide (1982) (Ex. 1009);</td></tr>
<tr><td>i.</td><td>Petition for Covered Business Method Patent Review Under 35 U.S.C. §§ 321-329 and § 18 of the Leahy-Smith America Invents Act, Case CBM2014-179, JP Morgan Chase & Co., and JP Morgan Chase Bank, N.A. ("Chase"), Petitioner. (U.S. Patent No. 5,940,510) (Ex. 1006);</td></tr>
<tr><td>j.</td><td>Declaration of Stephen D. Bristow in support of Chase Petition for Covered Business Method Review of U.S. Patent No. 5,940,510 (Ex. 1018);</td></tr>
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<tr><td>m.</td><td>Opinion and order regarding claim construction in In re: Maxim Integrated Prods., Inc. MDL No. 2354, Misc. No. 12-244-JFC (W.D. Pa.) (Ex 1012; hereinafter "CC Op.").</td></tr>
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III.   LEVEL OF ORDINARY SKILL AND RELEVANT TIME

16.   It is my opinion that a person of ordinary skill in the art at the time of the inventions claimed in the '510 Patent would have had at least a B.S. degree in electrical engineering or computer engineering with at least two years of practical or post-graduate work in the areas of secure financial transactions and real-time microcontroller programming, or, alternatively, an additional year (at least three years) of postgraduate or professional experience in computer systems engineering related to secure data transactions, or the equivalent. I was a person of at least ordinary skill in this art in the time period from 1994 to 1996. I remain a person of at least ordinary skill in this art today.

17.   The basis for my familiarity with the level of ordinary skill is my interaction with large numbers of workers in the computing field who were at least at this level of skill. The pertinent art was the configuration and arrangement of commercially available computer components, networks, systems, and software to satisfy particular customer specifications, together with such programming as might be necessary to tie the components together and operate in the desired manner.

18.   In reaching my opinion as to the hypothetical person of ordinary skill in the art, I have considered the types of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level and professional capabilities of workers in the field.

IV.   LEGAL STANDARDS

A.   Anticipation

19.   It is my understanding that a claim may be invalid as anticipated under 35 U.S.C. § 102 if each and every element of a claim, as properly construed, is disclosed either explicitly or inherently in a single prior art reference, subject to the limitations imposed by § 102 in paragraphs a-g. Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes the claimed limitations, it anticipates. Persons of ordinary skill need not recognize the inherent characteristics or functioning of the prior art. In addition, a new scientific explanation for the

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