

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.
Petitioner

v.

CAPELLA PHOTONICS, INC.
Patent Owner

Case IPR2014-01166
Patent RE42,368

**DECLARATION OF DR. ALEXANDER V. SERGIENKO
IN SUPPORT OF THE PATENT OWNER RESPONSE**

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IPR2014-01166

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I, Dr. Alexander V. Sergienko, declare as follows:

I. INTRODUCTION

1. My name is Alexander V. Sergienko. Capella Photonics, Inc. has retained me as an expert witness. I have been asked to provide my expert opinion on the validity of claims 1-6, 9-13, and 15-22 of U.S. Patent No. RE42,368 to Chen et al. (“368 patent”).

2. I am being compensated for my work. My compensation is not contingent upon and in no way affects the substance of my testimony.

II. QUALIFICATIONS

3. I have a Ph.D. in Physics from Moscow State University in 1987 and a Master of Science Degree in Physics from Moscow State University in 1981.

4. I am currently a full professor at Boston University where I hold joint appointments in the Photonics Center, the Department of Electrical and Computer Engineering, and the Department of Physics. My expertise and research interests include optics, photonics, quantum physics, laser physics, nonlinear optics, and precise optical measurement in telecommunication and optical engineering.

5. I have experience and familiarity with the technical areas involved in this case. With over 30 years of research experience in the field of optics, I have studied and worked with optical components such as those at issue in this case. For

example, during my tenure as a Director of the Quantum Communication and Measurement Laboratory at the Boston University Photonics Center, I developed quantum optical technologies for high-resolution evaluation of optical device parameters (*e.g.*, fibers, switches, and amplifiers). With this research I have evaluated the differences in wavelength selective switches produced by commercial vendors. I have thus studied switching technologies such as microelectromechanical (“MEMS”) mirrors, liquid crystal (“LC”), combined MEMS+LC, and liquid crystal on silicon (“LCOS”).

6. For more than a decade, my focus has been on high-resolution measurement of polarization mode dispersion (“PMD”) in modern wavelength selective switches operating in 40 Gb/s and 100 Gb/c telecommunication reconfigurable optical add-drop multiplexer networks. I have worked to develop measurement technologies that are based on the use of quantum properties of light and enable measurement of PMD in discrete telecommunication devices, fibers, and switches with a superior resolution of $< 1\text{fs}$. For details on my research regarding high-resolution measurement of PMD, see, *e.g.*, Fraine, D.S. Simon, O. Minaeva, R. Egorov, and A.V. Sergienko, *Precise evaluation of polarization mode dispersion by separation of even- and odd-order effects in quantum interferometry*, OPTICS EXPRESS, v. 19, no. 21, 22820 (2011).

7. I have published 132 technical papers in research journals in the area of photonics, physics, and optical technology. Several of these research journals include: Nature Communications; Journal of the Optical Society of America; Physical Review Letters; and Physical Review A. I have presented more than 300 research papers at major international research conferences. I have contributed 7 book chapters on precise optical measurement and quantum optics. I have also served as the sole editor of a book titled *Quantum Communications and Cryptography*.

8. I have taught courses in optical measurement, quantum optics, photonics, electrical circuit theory, and analog electronics. I have also been an advisor to graduate students researching various subjects in physics, electrical engineering, and photonics.

9. I am a Fellow of the Optical Society of America (OSA) (<10% of total OSA members) and have been a lead of Quantum Computing and Communication Technical Group at OSA for several years. I am a member of the American Physical Society and a member of IEEE.

10. From 1990 to 1996, I worked for the University of Maryland and the National Institute of Standards and Technology ("NIST"). While at NIST, I developed several novel optical measurement technologies that outperformed

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