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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
SAMSUNG ELECTRONICS AMERICA, INC., AND APPLE INC.,
Petitioner
v.

IXI IP, LLC
Patent Owner

Case No. IPR2015-01444
Patent 7,039,033

**DECLARATION OF DR. NARAYAN MANDAYAM
IN SUPPORT OF IXI IP, LLC'S
PATENT OWNER RESPONSE**

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I, Narayan Mandayam, do hereby declare:

1. I am making this declaration at the request of Patent Owner IXI IP, LLC in the matter of *Inter Partes* Review of U.S. Patent No. 7,039,033 (the '033 Patent") to Amit Haller et al.

2. In the preparation of this declaration, I have studied:

- the '033 Patent (Ex. 1001);
- S. M. Bellovin et al., Network Firewalls, Network Firewalls, IEEE Communications Magazine, Vol. 32, Issue 9, pp. 50-57, 1999 ("Bellovin"; Ex. 1002)
- PCT Publication No. WO 01/76154 A2 22("Marchand PCT"; Exhibit 1005);
- U.S. Patent Application No. 09/451,529 ("Marchand Priority"; Ex. 1006);
- Handley et al., *Request for Comments 2543 SIP: Session Initiation Protocol*, The Internet Society, March, 1999 ("RFC 2543"; Ex. 1007);
- U.S. Patent No. 6,836,474 ("Larsson"; Ex. 1008);
- K. Arnold et. al., The JINI™ Specification, Addison-Wesley, June 1, 1999 ("JINI Spec."; Ex. 1009);
- U.S. Patent No. 6,560,642 ("Nurmann"; Ex. 1010);
- U.S. Patent No. 6,771,635 ("Vilander"; Ex. 1011);
- R. Droms, Request for Comments 2131 Dynamic Host Con-figuration Protocol, The Internet Society, March, 1997 ("RFC 2131"; Ex. 1014);
- Claim Chart from IXI's Infringement Contentions of U.S. Patent No. 7,039,033 in 14-cv-4428 (April 9, 2015) (Ex. 1012);
- Claim Chart from IXI's Infringement Contentions of U.S. Patent No. 7,039,033 in 14-cv-4355 (March 27, 2015) (Ex. 1013);

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- Petition for Inter Partes Review (Paper 2);
- Kiaei Declaration (Ex. 1003);
- Patent Owner's Preliminary Response (Paper 6);
- Decision Institution of Inter Partes Review ("Paper 8");
- March 15, 2016 Deposition Transcript of Dr. Kiaei regarding IPR2015-01443 (Ex. 2302);
- March 16, 2016 Deposition Transcript of Dr. Kiaei regarding IPR2015-01444 (Ex. 2303);
- March 17, 2016 Deposition Transcript of Dr. Kiaei regarding IPR2015-01445 and IPR2015-01446 (Ex. 2304);
- Specifcation of the Bluetooth System, Specification Volume 1 (December 1, 1999) ("Bluetooth Specification"; Ex. 2305)[1].
- "IP Network Address Translator (NAT) Terminology and Considerations," RFC 2663, August 1999 ("RFC 2663"; Ex. 2306).

3. In forming the opinions expressed below, I have considered the documents listed above;he relevant legal standards, including the standard for obviousness and any additional authorities as cited in the body of this declaration; and my knowledge and experience based upon my work is this area as described below.

[1] The Bluetooth Specification was obtained from http://grouper.ieee.org/groups/802/15/Bluetooth/core_10_b.pdf. (Last accessed Apr. 5, 2016). The front page of the Bluetooth Specification identifies that it is from December 1, 1999. Based on my experience with Bluetooth technology, the Bluetooth Specification would have been publicly available on or about December 1, 1999.

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I. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

4. I received a bachelor degree (with Honors) in 1989 from the Indian Institute of Technology, Kharagpur, and M.S. and Ph.D. degrees in 1991 and 1994 from Rice University, Houston, TX, all in electrical engineering.

5. I was a Research Associate at the Wireless Information Network Laboratory ("WINLAB"), Department of Electrical & Computer Engineering, Rutgers University, between 1994 and 1996. In September 1996, I joined the faculty of Department of Electrical & Computer Engineering at Rutgers where I became Associate Professor in 2001, Professor in 2003, and Distinguished Professor in 2014. I also served as the Peter D. Cherasia Endowed Faculty Scholar at Rutgers University from 2010 to 2014. Currently, I also serve as Associate Director at WINLAB where I conduct research in various aspects of wireless systems and networks. I teach courses at Rutgers on the topics of Wireless System Design, Wireless Communication Technologies, Wireless Revolution, Detection and Estimation Theory and Introduction to Computing for Engineers. I was a visiting faculty fellow in the Department of Electrical Engineering, Princeton University in Fall 2002 and a visiting faculty at the Indian Institute of Science in Spring 2003.

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6. My research focuses on wireless networks and communications, and I have worked on various aspects of networking and wireless devices. Over the last 25 years, I have published a wide range of articles on various aspects of wireless systems including techniques for data transmission, resource allocation strategies, mathematical modeling, and performance analysis. Using constructs from game theory, communications and networking, my work has focused on system modeling and performance, signal processing as well as radio resource management for enabling wireless technologies to support various applications. I have coauthored 2 books on wireless networks (*Principles of Cognitive Radio*, Cambridge (2012) and *Wireless Networks: Multiuser Detection in Cross-Layer Design*, Springer (2005)), 6 book chapters and published over 200 papers in prestigious international journals and conferences. I have also given numerous invited presentations at a variety of industry, government, and academic forums.

7. Specifically, I have been doing precompetitive research in various aspects of wireless data transmission for over 25 years addressing PHY, MAC and Network layer issues. I have made seminal research contributions to wireless data communications on issues ranging from the systems level (such as power control, capacity evaluation, protocol design, medium access control, and radio resource management) to the physical layer (such as detection and estimation). My

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