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Filed on behalf of Intel Corporation

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UNITED STATES PATENT AND TRADEMARK OFFICE

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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INTEL CORPORATION  
Petitioner

v.

QUALCOMM INCORPORATED  
Patent Owner

Case IPR2019-00048

**DECLARATION OF PATRICK FAY, PH.D.**  
**U.S. PATENT NO. 9,154,356**  
**CLAIMS 1, 9, 10, 17, and 18**

**TABLE OF CONTENTS**

	<b>Page</b>
I. INTRODUCTION .....	1
II. UNDERSTANDING OF THE LAW .....	4
III. BACKGROUND TECHNOLOGY.....	10
A. Basic Receiver Front End.....	11
B. Low Noise Amplifiers .....	16
1. Cascode Configuration.....	17
C. Carrier Aggregation.....	18
D. Optional Receiver Circuits .....	22
1. Impedance Matching Circuits .....	23
2. Feedback Circuit .....	25
3. Attenuation Circuit.....	26
4. Inductors.....	27
IV. OVERVIEW OF THE '356 PATENT .....	28
A. Independent Claim 1 .....	28
B. Independent Claim 17 .....	33
V. LEVEL OF ORDINARY SKILL IN THE ART .....	33
VI. CLAIM CONSTRUCTION .....	34
A. “carrier aggregation” .....	34
VII. SUMMARY OF THE PRIOR ART REFERENCES.....	36
A. <i>A Scalable 6-to-18 GHz Concurrent Dual-Band Quad-Beam Phased-Array Receiver in CMOS</i> (“Jeon”).....	36
B. U.S. Patent Publication No. 2010/0237947 A1 (“Xiong”) .....	38
C. 3GPP TR 36.912 Feasibility study for Further Advancements for E-UTRA (LTE-Advanced) (Release 9) (“Feasibility Study”).....	41

D. *Digitally-Controlled RF Passive Attenuator in 65 nm CMOS for Mobile TV Tuner ICs (“Youssef”)* .....42

VIII. SUMMARY OF CONCLUSIONS .....45

IX. INVALIDITY OF THE CHALLENGED CLAIMS.....45

A. Ground I: Claims 1 and 17-18 Are Obvious Over Jeon in View of Xiong.....45

    1. Claim 1 .....45

    2. Claim 17 .....68

    3. Claim 18.....70

B. Ground II: Claims 9 and 10 Are Obvious Over Jeon In View of Xiong and Youssef .....96

    1. Claim 9.....96

    2. Claim 10.....100

C. Ground III: Claims 1 and 17-18 Are Obvious Over Jeon in View of Xiong and the Feasibility Study .....106

D. Ground IV: Claims 9 and 10 Are Obvious Over Jeon In View of Xiong, the Feasibility Study, and Youssef.....112

    1. Claim 9.....114

    2. Claim 10.....114

X. AVAILABILITY FOR CROSS-EXAMINATION .....115

XI. RIGHT TO SUPPLEMENT .....116

XII. JURAT .....116

## I. INTRODUCTION

1. My name is Patrick Fay.

2. I am a Professor with tenure in the Department of Electrical Engineering at the University of Notre Dame. I earned a Bachelor of Science in Electrical Engineering from the University of Notre Dame in 1991, a Master of Science in Electrical Engineering from the University of Illinois at Urbana-Champaign in 1993, and a Doctorate (Ph.D.) degree in Electrical Engineering from the University of Illinois at Urbana-Champaign in 1996.

3. I have approximately 22 years of experience in the field of electrical engineering, with particular experience in the field of RF transceivers, RF front ends, and related components. I have been the Director of the Notre Dame Nanofabrication Facility since 2003 and established the High-Speed Circuits and Devices Laboratory at Notre Dame in 1998.

4. For example, I have worked and published extensively on high-frequency devices suitable for use in low noise amplifiers, mixers, and oscillators, all of which are fundamental components of RF receivers and RF front ends. I have also published on compact models needed to design circuits with these devices, as well as benchmarking studies comparing these technologies to current approaches.

5. I have taught graduate and undergraduate level courses at the University of Illinois and at Notre Dame in electrical engineering, semiconductor devices, circuit design, and microwave circuit design. I regularly teach courses in analog circuit design. I developed and teach a course on RF and Microwave Circuits for Wireless Communications that combines classwork as well as laboratory measurements and design, with a focus on RF receivers. For these efforts, I was awarded the College of Engineering's Outstanding Teacher Award in 2015.

6. I have authored or co-authored more than 150 peer-reviewed technical publications, more than 160 conference presentations, and have 9 U.S. patents, with others pending, in the areas of inter-chip communication, semiconductor devices for low-power applications, and semiconductor devices for high-frequency applications. My resume includes a sample list of these publications.

7. I was named fellow of the Institute of Electrical and Electronics Engineer (IEEE) in 2016, which is the highest grade of membership conferred by the IEEE Board of Directors on an individual member.

8. In my time as a faculty member at Notre Dame, I have received grants to support research in device technologies suitable for high-performance RF applications. This work has been supported by the Office of Naval Research

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