



Haris Al Qodri Maarif
Teddy Surya Gunawan

Multilayers Fast Mode Decision Algorithm for Scalable Video Coding

Design, implementation, and streaming evaluation
on IEEE 802.11g wireless LAN

 **LAMBERT**
Academic Publishing

**Haris Al Qodri Maarif
Teddy Surya Gunawan**

**Multilayers Fast Mode Decision
Algorithm for Scalable Video Coding**

**Design, implementation, and streaming evaluation
on IEEE 802.11g wireless LAN**

LAP LAMBERT Academic Publishing

Impressum/Imprint (nur für Deutschland/only for Germany)

Bibliografische Information der Deutschen Nationalbibliothek: Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über <http://dnb.d-nb.de> abrufbar.

Alle in diesem Buch genannten Marken und Produktnamen unterliegen warenzeichen-, marken- oder patentrechtlichem Schutz bzw. sind Warenzeichen oder eingetragene Warenzeichen der jeweiligen Inhaber. Die Wiedergabe von Marken, Produktnamen, Gebrauchsnamen, Handelsnamen, Warenbezeichnungen u.s.w. in diesem Werk berechtigt auch ohne besondere Kennzeichnung nicht zu der Annahme, dass solche Namen im Sinne der Warenzeichen- und Markenschutzgesetzgebung als frei zu betrachten wären und daher von jedermann benutzt werden dürften.

Coverbild: www.ingimage.com

Verlag: LAP LAMBERT Academic Publishing GmbH & Co. KG
Dudweiler Landstr. 99, 66123 Saarbrücken, Deutschland
Telefon +49 681 3720-310, Telefax +49 681 3720-3109
Email: info@lap-publishing.com

Approved by: Kuala Lumpur, International Islamic University Malaysia, 2011

Herstellung in Deutschland:
Schaltungsdienst Lange o.H.G., Berlin
Books on Demand GmbH, Norderstedt
Reha GmbH, Saarbrücken
Amazon Distribution GmbH, Leipzig
ISBN: 978-3-8454-7018-4

Imprint (only for USA, GB)

Bibliographic information published by the Deutsche Nationalbibliothek: The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

Any brand names and product names mentioned in this book are subject to trademark, brand or patent protection and are trademarks or registered trademarks of their respective holders. The use of brand names, product names, common names, trade names, product descriptions etc. even without a particular marking in this works is in no way to be construed to mean that such names may be regarded as unrestricted in respect of trademark and brand protection legislation and could thus be used by anyone.

Cover image: www.ingimage.com

Publisher: LAP LAMBERT Academic Publishing GmbH & Co. KG
Dudweiler Landstr. 99, 66123 Saarbrücken, Germany
Phone +49 681 3720-310, Fax +49 681 3720-3109
Email: info@lap-publishing.com

Printed in the U.S.A.
Printed in the U.K. by (see last page)
ISBN: 978-3-8454-7018-4

Copyright © 2011 by the author and LAP LAMBERT Academic Publishing GmbH & Co. KG and licensors
All rights reserved. Saarbrücken 2011

TABLE OF CONTENTS

TABLE OF CONTENTS.....	i
LIST OF TABLES.....	ii
LIST OF FIGURES.....	iv
LIST OF ABBREVIATIONS.....	vi
LIST OF SYMBOLS.....	viii
CHAPTER 1 Introduction.....	1
1.1 Background.....	1
1.2 Problem Statement and Its Significance.....	3
1.3 Research Objectives.....	3
1.4 Research Methodology.....	3
1.5 Outlines Of the Book.....	4
CHAPTER 2 Scalable Video Coding And Fast mode Decision Algorithms.....	5
2.1 Introduction.....	5
2.2 Scalable Video Coding.....	5
2.3 H.264/AVC Basics.....	6
2.3.1 Network Abstraction Layer (NAL).....	6
2.3.2 Video Coding Layer.....	7
2.3.3 Supported Entropy Coding.....	10
2.4 Scalable Extension of H.264/AVC.....	10
2.4.1 Temporal Scalability.....	10
2.4.2 Spatial Scalability.....	13
2.4.3 Quality Scalability.....	18
2.4.4 Combined Scalability.....	19
2.5 Fast Mode Decision.....	21
2.5.1 Mode Decision in Scalable Video Coding.....	21
2.5.2 Current Algorithms on Fast Mode Decision.....	23
2.6 Performance Evaluation Metrics.....	30
2.7 The JSVM and SVEF Reference Software.....	31
2.7.1 Joint Scalable Video Model (JSVM).....	32
2.7.2 Scalable Video Evaluation Framework.....	33
2.8 Wireless LAN (IEEE 802.11g).....	34
2.9 Summary.....	34
CHAPTER 3 Fast Mode Decision Implementation and Evaluation.....	35
3.1 Introduction.....	35
3.2 Proposed Fast Mode Decision Algorithm.....	36
3.3 Scalability Analysis.....	39
3.4 Complexity Analysis.....	48
3.5 Effect of Parameters.....	60
3.5.1 Effect of Various GOP Values.....	60
3.5.2 Effect of Various QP Values.....	60
3.5.3 Effect of Various Encoding Layers.....	66
3.6 Summary.....	68
CHAPTER 4 Video Streaming Evaluation.....	69
4.1 Introduction.....	69
4.2 Simulation Scenario.....	69
4.3 NALU Specifications.....	71
4.4 Bottle Neck.....	72

4.5	Streaming Process.....	73
4.6	Performance Analysis.....	74
4.7	Summary.....	75
CHAPTER 5 ConclusionS AND Future Works.....		77
5.1	Conclusions.....	77
5.2	Contributions.....	78
5.3	Recommendations.....	78
BIBLIOGRAPHY.....		81
APPENDIX A SVC MAIN CONFIGURATION PARAMETERS.....		85
APPENDIX B SVC LAYER CONFIGURATION PARAMETERS.....		91
APPENDIX C MAIN CONFIGURATION FILES.....		101
APPENDIX D LAYER CONFIGURATION FILES.....		102