

Multimedia Encryption, Transmission and Authentication

Edited by

Othman Omran Khalifa, B.Sc., M.Sc., Ph.D.
International Islamic University Malaysia

Aisha-Hassan Abdulla, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia

Teddy Surya Gunawan, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Multimedia Encryption, Transmission and Authentication

Edited by

Othman Omran Khalifa, B.Sc., M.Sc., Ph.D.
International Islamic University Malaysia

Aisha-Hassan Abdulla, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia

Teddy Surya Gunawan, B.Sc., M.Sc., Ph.D.,
International Islamic University Malaysia



IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Cataloguing-in-Publication Data Perpustakaan Negara Malaysia

ISBN: 978-967-418-160-4

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

Contents

		Page No.
Part I- Multimedia Encryption and Transmission		
Chapter 1	Image and Video Coding Techniques <i>Sinzobakwira Issa and Othman O. Khalifa</i>	2
Chapter 2	Video Coding: MPEG standards <i>Othman O. Khalifa, Sinzobakwira Issa and Muhammad Umar Siddiqi</i>	7
Chapter 3	H.264/Advance Video Coding Standard <i>Othman O. Khalifa, Sinzobakwira Issa and Aisha-Hassan Abdulla</i>	16
Chapter 4	Development of Scalable Video Compression algorithm <i>Othman O. Khalifa, Sinzobakwira Issa and Mohamed Abomhara</i>	22
Chapter 5	Video Encryption Using Computation between H.264/AVC and AES Encryption Algorithm <i>Mohamed Abomhara Omar Zakaria and Othman O. Khalifa</i>	29
Chapter 6	Selective Video Encryption Algorithm Based on H.264/AVC and AES <i>Mohamed Abomhara Omar Zakaria and Othman O. Khalifa</i>	39
Chapter 7	Scalable Video Coding: A Review <i>Haris Al Qodri Maarif, Teddy Surya Gunawan, Othman O. Khalifa</i>	56
Chapter 8	JSVM Reference Software <i>Haris Al Qodri Maarif, Teddy Surya Gunawan, Othman O. Khalifa</i>	71
Chapter 9	Fast Mode Decision Algorithm <i>Haris Al Qodri Maarif, Teddy Surya Gunawan, Othman O. Khalifa</i>	78
Chapter 10	An Overview of Scalable Video Streaming <i>Mohammed Abumuala, Othman Khalifa and Aisha-Hassan A. Hashim</i>	88
Chapter 11	A Survey on Video Segmentation for Real-Time Applications <i>Haris Al Qodri Maarif, Sara Bilal, Teddy Surya Gunawan, Othman O. Khalifa</i>	100
Chapter 12	H.264/AVC Video Coding Tools and Functions <i>Sinzobakwira Issa, Othman O. Khalifa and Aisha-Hassan Abdulla</i>	107
Chapter 13	Speech Coding Techniques and Algorithms <i>Liban A. Kassim, Othman O. Khalifa, Teddy S. Gunawan</i>	116
Part II- Digital Watermarking		
Chapter 14	Digital Watermarking: An Overview <i>Othman O. Khalifa and Yusnita binti Yusof</i>	135
Chapter 15	Digital Watermarking : Related work <i>Othman O. Khalifa and Yusnita binti Yusof</i>	143
Chapter 16	Digital Watermarking Techniques and Methodologies <i>Othman O. Khalifa and Yusnita binti Yusof</i>	150
Chapter 17	Wavelet Transform for Digital Images Watermarking <i>Othman O. Khalifa, Yusnita Yusof</i>	156
Chapter 18	Wavelet Digital Watermarking System Design and Performance Evaluation <i>Othman O. Khalifa and Yusnita binti Yusof</i>	166
Chapter 19	An Improved Wavelet Digital Watermarking Software Implementation <i>Othman O. Khalifa and Yusnita binti Yusof</i>	175

Chapter 20	Adaptive Digital Watermarking System for Authentication of Intellectual Properties <i>Rashidah F. Olanrewaju, Azizah Abd Manaf and Akram Zeki</i>	182
Chapter 21	An Evaluation of Transform Domain Watermarking and its application to Intellectual Properties of images <i>Rashidah F. Olanrewaju, Othman O Khalifa, Aisha Hassan Hashim, A.A. Aburas and Akram Zeki</i>	192
Chapter 22	Applications of Digital Watermarking: Current and Future Trends <i>Othman O. Khalifa and Yusnita binti Yusof</i>	198
Chapter 23	State-Of-The-Art Digital Watermarking Attacks <i>Othman O. Khalifa and Yusnita binti Yusof</i>	204
Chapter 24	Performance evaluations of Digital Watermarking System <i>Yusnita binti Yusof and Othman O. Khalifa</i>	215
Part-III Multicast Transmission		
Chapter 25	Classifications Of Multicast Routing In Mobile Ad Hoc Networks <i>Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman O. Khalifa and Liana Qabajeh</i>	221
Chapter 26	Qualitive study on Multicast Routing Protocols In Manets <i>Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman O. Khalifa and Liana Qabajeh</i>	228
Chapter 27	Issues In Location-Based Multicast Routing In Manets <i>Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman O. Khalifa and Liana Qabajeh</i>	235
Chapter 28	Multicasting Challenges In Wireless Mesh Networks <i>M. L. Sanni, A. A. Hashim, F. Anwar and J. I. Daoud</i>	241
Chapter 29	Mobility Management In Multicast Environment <i>M. L. Sanni, A. A. Hashim, A. W. Naji and G. S. M. Ahmed</i>	249
Chapter 30	<i>Multicast Security</i> : Issues and Solutions <i>Mohammad Qabajeh, Aisha-Hassan A. Hashim and Othman O. Khalifa</i>	257
Chapter 31	Real-time MPEG-4 transmission over Wireless LAN <i>Abdirisag Mohammed Jama and Othman O. Khalifa</i>	263

Chapter 5

Video Encryption Using Computation between H.264/AVC and AES Encryption Algorithm

⁽¹⁾*Mohamed Abomhara Omar Zakaria and Othman O. Khalifa*⁽²⁾

⁽¹⁾University of Malaya

⁽²⁾Electrical and Computer Engineering

International Islamic University Malaysia

5.1. Introduction

With the advanced development of the Internet and multimedia, it is easier for digital data owners to transfer multimedia documents across the Internet. Therefore, multimedia security has become one of the most aspects of communications with the continuous increase in the use online transmission. Some applications, such as TV broadcast and military applications require a special and reliable secure storage or transmission to be completely secured against theft, alteration or misuse. Furthermore, videoconferencing has become a daily characteristic of financial businesses. As it saves time, effort, and travel expenses for large companies. In such applications, digital video is compressed to a low bit rate while it is stored or transmitted [1]. There are several important standards such as MPEG-1, MPEG-2/h.262 and MPEG-4 have been developed for video compression, but with the target to double the coding efficiency and high reliability in video transmission. The Moving Picture Expert Group (MPEG) and the Video Coding Expert Group (VCEG) have developed a new standard that promises to outperform the earlier MPEG-4 and H.263 standard. H.244/AVC provides the most current balance between the coding efficiency, implementation complexity and cost [2][3][4].

Communication security for multimedia can be accomplished by means of standard symmetric key cryptography, as such media can be treated as binary sequence and the whole data can be encrypted using a cryptosystem such as AES or DES [3][5].

In general, when the multimedia data is static (not a real-time streaming) it can be treated as regular binary data and use the conventional encryption techniques. In the past, encrypting the entire video data using standard encryption algorithms was referred to as a Naïve approach [6]. This method can provide substantially high security but it incurs huge