

Advances in Mobility Management for IP Networks

Editors:

Aisha Hassan Abdalla Hashim

Othman Khalifa

Shihab A. Hameed



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Advances in Mobility Management for IP Networks

Editors:

Aisha Hassan Abdalla Hashim

Othman Khalifa

Shihab A. Hameed



IIUM Press

Published by:

IUM Press
International Islamic University Malaysia

First Edition, 2011
©IUM Press, IUM

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.

Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Aisha Hassan Abdalla Hashim, Othman Khalifa, Shihab A. Hameed: *Advances in Mobility Management for IP Networks*

ISBN: 978-967-418-140-6

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

Printed by :

IUM 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

Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543

EMAIL: iumprinting@yahoo.com

TABLE OF CONTENTS

No.	Title	Page No.
	Acknowledgement	v
	Preface	vi
	Part 1: Internet Engineering Task Force (IETF) Approaches for Multicast and Mobility Management	1
1	Introduction to Multicast Mobility Management Aisha Hassan Abdalla Hashim, Shihab A. Hameed, Jamal Ibrahim Daoud	2
2	Research Direction in Mobile IPv6 Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim, Sellami Ali, Wajdi Al-Khateeb	9
3	Operation of Context Transfer Protocol Aisha Hassan Abdalla Hashim, Othman Khalifa, Azana Hafizah Mohd Aman, Farhat Anwar, Shihab A. Hameed	15
4	The Study of Multicast Hierarchical Mobile IPv6 Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim, Akram M. Zeki	21
5	The Study Of Multicast Listener Discovery Aisha Hassan Abdalla Hashim, Imad Fakhri Taha Alshaikhli, Azana Hafizah Mohd Aman, Sellami Ali	27
6	MIPv6 Based Approaches for Mobility Management Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim, Imad Fakhri Taha Alshaikhli	32
7	HMIPv6 Based Approaches for Mobility Management Aisha Hassan Abdalla Hashim, Wajdi Al-Khateeb, Farhat Anwar, Azana Hafizah Mohd Aman	36

Part 2: Extensions to Mobile Multicast Schemes

8	Introduction to Mobility Multicast Schemes Aisha Hassan Abdalla Hashim, Azana Hafizah Mohd Aman, Sellami Ali, Othman Khalifa	42
9	Qualitative Study of Mobility Management Approaches Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim, Imad Fakhri Taha Alshaikhli, Farhat Anwar	48
10	Architecture of M-HMIPv6/CXTP Aisha Hassan Abdalla Hashim, Azana Hafizah Mohd Aman	53
11	Intra Domain Movement of M-HMIPv6/ CXTP Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim	58
12	Inter Domain Movement of M-HMIPv6/ CXTP Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim	64
13	Message Format of M-HMIPv6/CXTP Aisha Hassan Abdalla Hashim, Azana Hafizah Mohd Aman	70
14	Signaling Flow of M-HMIPv6/ CXTP Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim	76
15	Development of the Service Recovery Time and Signaling Cost Function Aisha Hassan Abdalla Hashim, Azana Hafizah Mohd Aman	83
16	Evaluation Methods in Computer Networking Aisha Hassan Abdalla Hashim, Azana Hafizah Mohd Aman	88
17	Ns2 Simulation Environment in M-HMIPv6 Omer Mahmoud, Azana Hafizah Mohd Aman	93
18	Service Recovery of Multicast Hierarchical Mobile IPv6 with Context Transfer Aisha Hassan Abdalla Hashim, Azana Hafizah Mohd Aman	101
19	The Study of Signaling Cost Of M-HMIPv6 with Context Transfer Aisha Hassan Abdalla Hashim, Azana Hafizah Mohd Aman	106
20	Simulation Study of HMIPv6 And M-HMIPv6/CXTP Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim	112

21	Packet Loss in M-HMIPv6 with Context Transfer Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim	118
22	Evaluation of Handover Latency in M-HMIPv6 with Context Transfer Azana Hafizah Mohd Aman, Aisha Hassan Abdalla Hashim	124
23	Future Directions Azana Hafizah Mohd Aman, Omer Mahmoud, Aisha Hassan Abdalla Hashim	128
24	MIPv6 Extensions Abdulrhman Mohammed Bin Mahfodh, Abdi Nasir Ahmed, Aisha Hassan Abdalla Hashim, Omer Mahmoud, Md. Rafiqul Islam	133
25	IP Multicast Abdulrhman Mohammed Bin Mahfodh, Abdi Nasir Ahmed, Aisha Hassan Abdalla Hashim, Md. Rafiqul Islam, Rashid Abdelhaleem Saeed	139
26	Mobility Approaches to Support IP Multicast Abdulrhman Mohammed Bin Mahfodh, Abdi Nasir Ahmed, Aisha Hassan Abdalla Hashim, Rashid Abdelhaleem Saeed, Omer Mahmoud	144
27	Hierarchical Mobile Multicast Context Transfer (HMMCT) Abdulrhman Mohammed Bin Mahfodh, Abdi Nasir Ahmed, Aisha Hassan Abdalla Hashim, Omer Mahmoud, Rashid Abdelhaleem Saeed	152
28	Simulation Evaluation of HMMCT Abdulrhman Mohammed Bin Mahfodh, Abdi Nasir Ahmed, Aisha Hassan Abdalla Hashim, Omer Mahmoud, Rashid Abdelhaleem Saeed	157
29	Analytical Study of HMMCT Abdulrhman Mohammed Bin Mahfodh, Abdi Nasir Ahmed, Aisha Hassan Abdalla Hashim, Faiz Ahmed Mohamed Elfaki, Rashid Saad	165
Part 3: QoS Approaches		
30	Introduction to QoS Approaches in Mobile Ad Hoc Networks Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman Khalifa, Liana Qabajeh, Akram M. Zeki	171

31	Routing Protocols For Ad Hoc Wireless Networks	176
	Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman Khalifa, Liana Qabajeh, Gharib Subhi Mahmoud Ahmed	
32	Quality of Service (QoS) Issues In Manets	181
	Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman Khalifa, Liana Qabajeh, Jamal Ibrahim Daoud	
33	Supporting QoS Multicast Routing Over Mobile Ad Hoc Networks	186
	Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman Khalifa, Liana Qabajeh	
34	Position-Based Routing Protocols For Ad-Hoc Networks	191
	Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman Khalifa, Liana Qabajeh	
35	Simulation in Wireless Networks: An Overview	196
	Mohammad Qabajeh, Aisha-Hassan A. Hashim, Othman Khalifa, Liana Qabajeh , Faiz Ahmed Mohamed Elfaki	

HMIPV6 BASED APPROACHES FOR MOBILITY MANAGEMENT

AISHA HASSAN ABDALLA HASHIM¹, WAJDI AL-KHATEEB², FARIHAT ANWAR AND
AZANA HAFIZAH MOHD AMAN

*ECE Dept. Fac. of Eng., International Islamic Univ. Malaysia (IIUM), Jalan Gombak, 53100
Kuala Lumpur, Malaysia.*

aisha@iiu.edu.my¹, wajdi@iium.edu.my²

7.1 INTRODUCTION

Reviews of related hierarchical mobile IPV6 based approaches for mobility management in mobile multicast. Identify the shortcomings that need to be addressed in order to cater the needs of seamless handover in hierarchical mobile IPv6. Existing mobility management specifications do not provide an effective method to support mobile multicast services and the schemes are not generally accepted by Jian Feng Guan, Hong Ke Zhang, De Yun Gao, Hua Chun Zhou and Ya Juan Qin [1].

The challenges of mobile multicast is the reconstruction of the multicast tree as the Mobile Node (MN) transfer to a new network. The MN will be receiving the multicast data in old network, although it moves to new network and the cost associated with tree construction is high. As the mobile nodes handover to another network, the MN suffers from packet loss and joins delay.

In case the foreign network does not support the multicast, all the multicast traffic will be rejected. As long as tunnel used, the process of encapsulation and decapsulation must take place which in turn increase the size of the header and therefore increase the cost. Packet out of order, and packet duplication, when receive different multicast data from different multicast router.

7.2 HMIPV6 BASED APPROACHES

Mobile IP (MIP) based for mobile multicast solutions include MIPv6 [2] variants extensions, and Multicast Listener Discovery (MLD) extensions. These extensions usually put the multicast information in signaling or transfer MLD [3] state among access routers (ARs) to reduce the re-join delay and realize optimal multicast packets transmission [4].

The fundamental approach to deal with mobility in IPv6 is stated in RFC 3775 [2]. Most mobile multicast schemes extend the MIPv6 to carry the multicast information in signaling. Hierarchical Mobile Ipv6 (HMIPv6) is an extension to MIPv6. HMIPv6 [5] provides better performance compared MIPv6. Multicast HMIPv6 (M-HMIPv6) [6] is a multicast mobility scheme based on HMIPv6 [5] protocol. HMIPv6 introduces Mobility Anchor Points (MAP) as proxy elements to the existing MIPv6. The MAP is introduced in order to reduce communication delays with respect to the Home Agent (HA).

The delays are because Mobile IPv6 (MIPv6) involves roundtrip messages for location updates directly with the MNs Home Agent and the Correspondent Node (CN). As these