

IEEE Standard for Air Interface for Broadband Wireless Access Systems— Amendment 3: Multi-tier Networks

IEEE Computer Society
and the
IEEE Microwave Theory and Techniques Society

Sponsored by the
LAN/MAN Standards Committee

Currently in preview, click buy full version

IEEE Std 802.16q™-2015
(Amendment to
IEEE Std 802.16™-2012)

IEEE Standard for Air Interface for Broadband Wireless Access Systems—

Amendment 3: Multi-tier Networks

Sponsor
LAN/MAN Standards Committee
of the
IEEE Computer Society
and the
IEEE Microwave Theory and Techniques Society

Approved 16 February 2015
IEEE-SA Standards Board



Abstract: MAC/PHY protocol enhancements for cooperation among base stations in multi-tier networks to enhance interference mitigation, mobility management, and base station power management are specified in this amendment. Enhanced base stations shall support legacy mobile stations. PHY changes to any mobile stations are out of scope.

In addition, these protocol enhancements include management messaging between base stations, and between base stations and mobile stations.

Keywords: amendment, broadband wireless access (BWA), IEEE 802.16™, IEEE 802.16q™, multi-tier network, mobile broadband, orthogonal frequency-division multiple access (OFDMA), WirelessMAN-OFDMA Air Interface, wireless metropolitan area networks

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

Copyright © 2015 by The Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 16 March 2015. Printed in the United States of America.

IEEE, 802, and WirelessMAN are registered trademarks in the U.S. Patent & Trademark Office, owned by The Institute of Electrical and Electronics Engineers, Incorporated.

WiMAX Forum is a registered trademark of the WiMAX Forum (<http://www.wimaxforum.org>).

PDF ISBN 978-0-7381-9511-7 STD20097
Print ISBN 978-0-7381-9512-4 STDPD20097

IEEE prohibits discrimination, harassment, and bullying. For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>.
No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Important Notices and Disclaimers Concerning IEEE Standards Documents

IEEE documents are made available for use subject to important notices and legal disclaimers. These notices and disclaimers, or a reference to this page, appear in all standards and may be found under the heading “Important Notice” or “Important Notices and Disclaimers Concerning IEEE Standards Documents.”

Notice and Disclaimer of Liability Concerning the Use of IEEE Standards Documents

IEEE Standards documents (standards, recommended practices, and guides), both full-use and trial-use, are developed within IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (“IEEE-SA”) Standards Board. IEEE (“the Institute”) develops its standards through a consensus development process, approved by the American National Standards Institute (“ANSI”), which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and participate without compensation from IEEE. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

IEEE does not warrant or represent the accuracy or content of the material contained in its standards, and expressly disclaims all warranties (express, implied and statutory) not included in this or any other document relating to the standard, including, but not limited to, the warranties of: merchantability; fitness for a particular purpose; non-infringement; and quality, accuracy, effectiveness, currency, or completeness of material. In addition, IEEE disclaims any and all conditions relating to: results; and workmanlike effort. IEEE standards documents are supplied “AS IS” and “WITH ALL FAULTS.”

Use of an IEEE standard is wholly voluntary. The existence of an IEEE standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard.

In publishing and making its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

IN NO EVENT SHALL IEEE BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO: PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE PUBLICATION, USE OF, OR RELIANCE UPON ANY STANDARD, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE AND REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE.

Translations

The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE should be considered the approved IEEE standard.

Official statements

A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered or inferred to be the official position of IEEE or any of its committees and shall not be considered to be, or be relied upon as, a formal position of IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position of IEEE.

Comments on standards

Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE. However, IEEE does not provide consulting information or advice pertaining to IEEE Standards documents. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important that any responses to comments and questions also receive the concurrence of a balance of interests. For this reason, IEEE and the members of its societies and Standards Coordinating Committees are not able to provide an instant response to comments or questions except in those cases where the matter has previously been addressed. For the same reason, IEEE does not respond to interpretation requests. Any person who would like to participate in revisions to an IEEE standard is welcome to join the relevant IEEE working group.

Comments on standards should be submitted to the following address:

Secretary, IEEE-SA Standards Board
445 Hoes Lane
Piscataway, NJ 08854 USA

Laws and regulations

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document does not imply compliance to any applicable regulatory requirements. Implementers of the standard are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Copyrights

IEEE draft and approved standards are copyrighted by IEEE under U.S. and international copyright laws. They are made available by IEEE and are adopted for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making these documents available for use and adoption by public authorities and private users, IEEE does not waive any rights in copyright to the documents.

Photocopies

Subject to payment of the appropriate fee, IEEE will grant users a limited, non-exclusive license to photocopy portions of any individual standard for company or organizational internal use or individual, non-commercial use only. To arrange for payment of licensing fees, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Updating of IEEE Standards documents

Users of IEEE Standards documents should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect.

Every IEEE standard is subjected to review at least every ten years. When a document is more than ten years old and has not undergone a revision process, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE standard.

In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit the IEEE-SA Website at <http://ieeexplore.ieee.org/expel/standards.jsp> or contact IEEE at the address listed previously. For more information about the IEEE-SA or IOWA's standards development process, visit the IEEE-SA Website at <http://standards.ieee.org>.

Errata

Errata, if any, for all IEEE standards can be accessed on the IEEE-SA Website at the following URL: <http://standards.ieee.org/findstds/errata/index.html>. Users are encouraged to check this URL for errata periodically.

Patents

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE-SA Website at <http://standards.ieee.org/about/sasb/patcom/patents.html>. Letters of Assurance may indicate whether the submitter is willing or unwilling to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims, or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association.

Participants

This standard was developed by the IEEE 802.16 Working Group on Broadband Wireless Access, which develops the WirelessMAN[®] Standard for Wireless Metropolitan Area Networks.

IEEE 802.16 Working Group Officers

Roger B. Marks, *Chair*
Harry Bims, *Vice Chair*
Harry Bims, *Secretary*
Tim Godfrey, *Treasurer*

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which this standard was prepared and finalized for IEEE Ballot:

Harry Bims
Antonio Bovo

Jaesun Cha
Tim Godfrey
Eunkyung Kim

Roger Marks
Jisoo Park

Primary development was carried out by the Working Group's 802.16q Project Group, which had the following leadership team:

Harry Bims, *Chair*
Harry Bims, *Secretary*
Jaesun Cha, *Editor*

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Iwan Adhicandra
Thomas Alexander
Butch Anton
Harry Bims
Nancy Bravin
William Byrd
Keith Chow
Charles Cook
Grazia Delia
Richard Edgar
Avraham Freedman
James Gilb
Randall Groves
Michael Gunderson
Chris Guy
Marco Hernandez
Werner Hoelzl
Norihiko Ikeuchi

Sergiu Iordanescu
Akio Iso
Atsushi Ito
Rajiv Joshi
Shin'ya Kaku
Hyunjeong Kang
Viktor Karocki
Stuart Kerry
Bruce Kraemer
Arthur H. Light
Michael Lynch
Elvis Maculuba
Roger Marks
Jeffery Masters
Ronald Murias
Michael Newman
Nick S.A. Nikjoo
Paul Nikolich
Mitsuo Nohara

Satoshi Oyama
Venkatesha Prasad
Maximilian Riegel
Robert Robinson
Reinhard Schrage
Ju-Hyung Son
Kapil Sood
Thomas Starai
Rene Struik
Walter Struppler
Mark-Rene Uchida
Dmitri Varsanofiev
Haiming Wang
Karl Weber
Hung-Yu Wei
Andreas Wolf
Chun Yu Charles Wong
Oren Yuen

When the IEEE-SA Standards Board approved this standard on 16 February 2015, it had the following membership:

John Kulick, *Chair*
Jon Walter Rosdahl, *Vice Chair*
Richard H. Hulett, *Past Chair*
Konstantinos Karachalios, *Secretary*

Peter Balma
Farooq Bari
Ted Burse
Clint Chaplain
Stephen Dukes
Jean-Phillippe Faure
Gary Hoffman

Michael Janezic
Jeffrey Katz
Joseph L. Koepfinger*
David J. Law
Hung Ling
Oleg Logvinov
Ted Olsen
Glenn Parsons

Ron Peterson
Adrian Stephens
Peter Sutherland
Yatin Trivedi
Phil Winston
Don Wright
Yu Yuan

*Member Emeritus

Also included are the following nonvoting IEEE-SA Standards Board liaisons:

Richard DeBlasio, *DOE Representative*
Michael Janezic, *NIST Representative*

Catherine Berger
IEEE-SA Content Publishing

Kathryn Bennett
IEEE-SA Technical Community

Historical information regarding IEEE Std 802.16

The following individuals participated in the IEEE 802.16 Working Group during various stages of the standard's development. Since the initial publication, many IEEE standards have added functionality or provided updates to material included in this standard. Included is a historical list of participants who have dedicated their valuable time, energy, and knowledge to the creation of this standard.

IEEE 802.16 Standards	Date approved by IEEE	Officers at the time of Working Group Letter Ballot
IEEE Std 802.16-2001	6 December 2001	Roger B. Marks , <i>Working Group Chair, Task Group Chair, Technical Editor</i> Brian Kiernan , <i>Working Group Vice Chair</i> Carl Bushue , <i>Working Group Secretary</i> Carl Eklund , <i>MAC Chair</i> Jay Klein , <i>PHY Chair</i> Carl Eklund, Kenneth Stanwood, Stanley Wang , <i>MAC Editors</i> Jay Klein, Lars Lindh , <i>PHY Editors</i>
IEEE Std 802.16c™-2002 (amendment)	12 December 2002	Roger B. Marks , <i>Working Group Chair</i> Paul F. Struhsaker , <i>Working Group Vice Chair</i> Dean Chang , <i>Working Group Secretary</i> Kenneth Stanwood , <i>Task Group Chair</i> Carl Eklund , <i>Technical Editor</i>
IEEE Std 802.16a™-2003 (amendment)	29 January 2003	Roger B. Marks , <i>Working Group Chair</i> Carl Eklund , <i>Vice Chair</i> Dean Chang , <i>Working Group and Task Group Secretary</i> Brian Kiernan , <i>Task Group Chair</i> Nico van Waes , <i>Technical Editor</i> Brian Eidson , <i>Lead SCA PHY Editor</i>
IEEE Std 802.16-2004	24 June 2004	Roger B. Marks , <i>Working Group Chair</i> Kenneth Stanwood , <i>Vice Chair</i> Dean Chang , <i>Working Group Secretary</i> Gordon Antonello , <i>Task Group Chair</i> Itzik Kitroser , <i>Chief Technical Editor</i> Robert Nelson , <i>Assistant Editor</i> Brian Eidson , <i>SCA PHY Editorial Contributor</i> Nico van Waes , <i>Former Chief Technical Editor</i>
IEEE Std 802.16f™-2005 (amendment)	7 September 2005	Roger B. Marks , <i>Working Group Chair</i> Kenneth Stanwood , <i>Vice Chair</i> Dean Chang , <i>Working Group Secretary</i> Phillip Barber , <i>Task Group Chair</i> Changhoi Koo , <i>Task Group Vice Chair</i> Itzik Kitroser , <i>Task Group Vice Chair</i> Joey Chou , <i>IEEE 802.16f Chief Technical Editor</i>
IEEE Std 802.16e™-2005 and IEEE Std 802.16-2004/Cor 1-2005 (amendment and corrigendum)	7 December 2005 (amendment) and 8 November 2005 (corrigendum)	Roger B. Marks , <i>Working Group Chair</i> Kenneth Stanwood , <i>Vice Chair</i> Dean Chang , <i>Working Group Secretary</i> Brian Kiernan , <i>Task Group Vice Chair</i> Ronald Murias , <i>Chief Technical Editor</i> Itzik Kitroser , <i>Assistant Editor</i> Jose Puthenkulam , <i>Assistant Editor</i> Jonathan Labs , <i>Maintenance Task Group Chair</i> Itzik Kitroser , <i>Chief Technical Editor</i> Kenneth Stanwood , <i>Former Maintenance Task Group Chair</i>

IEEE 802.16 Standards	Date approved by IEEE	Officers at the time of Working Group Letter Ballot
IEEE Std 802.16g™-2007 (amendment)	December 2007	Roger B. Marks , <i>Working Group Chair</i> Jose Puthenkulam , <i>Vice Chair, Co-Editor</i> Peiyong Zhu , <i>Secretary</i> Phillip Barber , <i>Task Group Chair</i> Achim Brandt , <i>Chief Technical Editor</i>
IEEE Std 802.16-2009	May 2009	Roger B. Marks , <i>Working Group Chair</i> Peiyong Zhu , <i>Secretary</i> Jonathan Labs , <i>Maintenance Task Group Chair</i> Joseph Schumacher , <i>Chief Technical Editor</i> Joey Chou , <i>Assitant Editor</i> Itzik Kitroser , <i>Assitant Editor</i> Ronald Murias , <i>Assitant Editor</i> Scott Probasco , <i>Assitant Editor</i>
IEEE Std 802.16j™-2009 (amendment)	May 2009	Roger B. Marks , <i>Working Group Chair</i> Jose Puthenkulam , <i>Working Group Vice Chair</i> Peiyong Zhu , <i>Working Group Secretary</i> Mitsuo Nohara , <i>Task Group Chair</i> Peiyong Zhu , <i>Task Group Vice Chair</i> Mike Hart , <i>Task Group Vice Chair</i> Jung Je Son , <i>Chief Technical Editor</i>
IEEE Std 802.16h™-2010 (amendment)	June 2010	Roger B. Marks , <i>Working Group Chair</i> Jose Puthenkulam , <i>Working Group Vice Chair</i> Peiyong Zhu , <i>Working Group Secretary</i> Herbert Ruck , <i>Working Group Secretary</i> Scott Probasco , <i>Working Group Secretary</i> Mariana Goldhamer , <i>Task Group Chair</i> Harry Bims , <i>Task Group Vice Chair</i> Barry Lewis , <i>Task Group Vice Chair</i> Paul Piggini , <i>Task Group Vice Chair</i> Harry Bims , <i>Task Group Secretary</i> Jung Je Son , <i>Chief Technical Editor</i>
IEEE Std 802.16m™-2011 (amendment)	March 2011	Roger B. Marks , <i>Working Group Chair</i> Jose Puthenkulam , Rakesh Taori , <i>Working Group Vice Chairs</i> Herbert Ruck , Scott Probasco , Erik Colban , <i>Working Group Secretaries</i>
IEEE Std 802.16™-2012	June 2012	Roger B. Marks , <i>Working Group Chair</i> Rakesh Taori , <i>Working Group Vice Chair</i> Erik Colban , Harry Bims , <i>Working Group Secretaries</i>
IEEE Std 802.16p™-2012 (amendment)	August 2012	Roger B. Marks , <i>Working Group Chair</i> Rakesh Taori , <i>Working Group Vice Chair</i> Erik Colban , Harry Bims , <i>Working Group Secretaries</i>
IEEE Std 802.16n™-2013 (amendment)	March 2013	Roger B. Marks , <i>Working Group Chair</i> Harry Bims , <i>Working Group Secretary</i> Tim Godfrey , <i>Working Group Treasurer</i>
IEEE Std 802.16q™-2015 (amendment)	February 2015	Roger B. Marks , <i>Working Group Chair</i> Harry Bims , <i>Working Group Vice Chair and Secretary</i> Tim Godfrey , <i>Working Group Treasurer</i>

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which the draft of IEEE Std 802.16-2001 was approved:

Song An	Michael Hamilton	Lou Olsen
Jori Arrakoski	Baya Hatim	Yunsang Park
Arun Arunachalam	Srinath Hosur	Brian Petry
Eli Avivi	Coleman Hum	Wayne Pleasant
C. R. Baugh	Wayne Hunter	Moshe Ran
Carlos Belfiore	Eric Jacobsen	Stanley Reible
Anader Benyamin-Seevar	Hamadi Jamali	Valentine Rhodes
Carl Bushue	Jacob Jorgensen	David Ribner
Baruch Buskila	Mika Kasslin	Gene Robinson
Dean Chang	Brian Kiernan	Walt Roehr
Naftali Chayat	John Kim	Durga Satapathy
Rémi Chayer	Itzik Kitroser	Glen Sater
Mary Condie	Allan Klein	Vito Scaringi
José Costa	Jay Klein	Randall Schwartz
Bruce Currivan	Demosthenes Kostas	Menashe Shahar
Amos Dotan	Yigal Leiba	Chet Shirali
Keith Doucet	Barry Lewis	George Stamatelos
Roger Durand	Sergio Licardie	Karl Stambaugh
Brian Eidson	John Liebetreu	Kenneth Stanwood
Carl Eklund	Lars Lindh	Michael Stewart
David Falconer	Willie Lu	Paul Thompson
George Fishel	Fred Lucas	Nico van Waes
Adrian Florea	J. Scott Marin	Subir Varma
Jeff Foerster	Roger B. Marks	Chao-Chun Wang
Robert Foster	Andy McGregor	Bob Ward
Avi Freedman	Ronald Meyer	Philip Whitehead
G. Jack Garrison	Andrew Middleton	David G. Williams
Conrad Grell	Apurva Mody	Vladimir Yanover
Phil Guillemette	Jim Mollenauer	Huanchun Ye
Zion Hadad	William Myers	Chaoming Zeng
Baruch Halachmi		Juan Carlos Zúñiga

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which the draft of IEEE Std 802.16c-2002 was prepared and finalized for IEEE Ballot:

Aditya Agrawal	Wayne Hunter	Manish Patel
Song An	David Husson	Kenneth Peirce
Gordon Antonello	Hamadi Jamali	Subbu Ponnuswamy
Reza Arefi	Jacob Jorgensen	Moshe Ran
S. Lek Ariyavisitakul	Tal Kaitz	Gene Robinson
Jori Arrakoski	Mika Kasslin	Shane Rogers
Malik Audeh	Phil Kelly	Amir Sarajedini
Eli Avivi	Ofer Kelman	Octavian Sarca
Yvon Belec	Brian Kiernan	Durga Satapathy
Anader Benyamin-Seeayar	Itzik Kitroser	Yossi Segal
Carl Bushue	Thomas Kolze	Radu Selea
Baruch Buskila	Jerome Krinock	James Simkins
Yuankai Chang	Jonathan Labs	Manoneet Singh
Dean Chang	John Langley	Sean Sonander
David Chauncey	Yigal Leiba	Kenneth Stanwood
Naftali Chayat	Moshe Levinson	Michael Stewart
Rémi Chayer	Xiaodong (Alex) Li	Paul F. Struhsaker
Brian Edmonston	John Liebetreu	Jose Tellado
Brian Eidson	Heinz Lycklama	Nico van Waes
Henry Eilts	Roger B. Marks	Subir Varma
Carl Eklund	Russell McKown	Arthur Wang
Avraham Freedman	Ronald Meyer	Lei Wang
Andrew Garrett	Andrew Middleton	Stanley Wang
G. Jack Garrison	Apurva Mody	Philip Whitehead
Marianna Goldhammer	Ronald Murias	Curt Wise
Zion Hadad	Robert Nelson	Vladimir Yanover
Yoav Hebron	Kim Olszewski	Heejung Yu

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which the draft of IEEE Std 802.16a-2003 was prepared and finalized for IEEE Ballot:

Aditya Agrawal	Jacob Jorgensen	Stanley Reible
Song An	Tal Kaitz	Gene Robinson
Gordon Antonello	Mika Kasslin	Shane Rogers
Reza Arefi	Phil Kelly	Amir Sarajedini
S. Lek Ariyavisitakul	Ofer Kelman	Octavian Sarca
Jori Arrakoski	Brian Kiernan	Durga Satapathy
Malik Audeh	Itzik Kitroser	Carl Scarpa
Eli Avivi	Thomas Kolze	Randall Schwartz
Yvon Belec	Jerome Krinock	Yossi Segal
Anader Benyamin-Seeyar	Rajeev Krishnamoorthy	Radu Selea
Carl Bushue	Jonathan Labs	Olivier Seller
Baruch Buskila	John Langley	James Simkins
Dean Chang	Yigal Leiba	Manoneet Singh
Yuankai Chang	Moshe Levinson	Sean Sonander
David Chauncey	Lingjie Li	Kenneth Stanwood
Naftali Chayat	Xiaodong (Alex) Li	Michael Stewart
Rémi Chayer	John Liebetreu	Paul F. Struhsaker
Brian Edmonston	Lars Lindh	John Sydor
Brian Eidson	Hui-Ling Lou	Shawn Taylor
Henry Eilts	Heinz Lycklama	David Trinkwon
Carl Eklund	Roger B. Marks	Nico van Waes
Avraham Freedman	Russell McKown	Subir Varma
Andrew Garrett	Ronald Meyer	Arthur Wang
G. Jack Garrison	Andrew Middleton	Lei Wang
Brian Gieschen	Apurva Mody	Stanley Wang
Marianna Goldhammer	Ronald Murias	Philip Whitehead
Zion Hadad	Robert Nelson	Curt Wise
Yoav Hebron	Kim Olszewski	Vladimir Yanover
Wayne Hunter	Mike Paff	Huanchun Ye
David Husson	Manish Patel	Heejung Yu
Hamadi Jamali	Kenneth Peirce	Wenhan Zhang
	Subbu Ponnuswamy	

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which the draft of IEEE Std 802.16-2004 was prepared and finalized for IEEE Ballot:

Aditya Agrawal
Gordon Antonello
Reza Arefi
Eli Avivi
Dean Chang
Naftali Chayat
Rémi Chayer
Brian Eidson
Carl Eklund
Marc Engels
Avraham Freedman
G. Jack Garrison
Marianna Goldhammer
Zion Hadad
David Johnston
Panyuh Joo
Tal Kaitz

Phil Kelly
Ofel Kelman
Brian Kiernan
Itzik Kitroser
Changhoi Koo
Jonathan Labs
Yigal Leiba
Barry Lewis
Lingjie Li
John Liebetreu
Lars Lindh
Hui-Ling Lou
Heinz Lycklama
Roger B. Marks
Russell McKown
Andrew Middleton

Ronald Murias
Robert Nelson
Kamlesh Rath
Gene Robinson
Yossi Segal
Radu Selea
James Simkins
Kenneth Stanwood
Carl Stevenson
Shawn Taylor
Rainer Ullmann
Nico van Waes
Eyal Verbin
Arthur Wang
Lei Wang
Stanley Wang
Vladimir Yanover

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16f-2005 was prepared and finalized for IEEE Ballot:

Edward Agis	Zion Hadad	Dong-Il (Stephan) Moon
Aditya Agrawal	Yung Hahn	Ronald Murias
Baraa Al-Dabagh	Jun Han	Robert Nelson
Mario Aliotta	John Haskin	Gunnar Nitsche
Dov Andelman	Prakash Iyer	Paul Odlyzko
Gordon Antonello	Moo Ryong Jeong	Shlomo Ovadia
Sanjeev Athalye	Brian Johnson	Pyung-Su Park
Eli Avivi	Panyuh Joo	Trevor Pearman
Raja Banerjea	Tal Kaitz	Greg Phillips
Phillip Barber	Olfer Kelman	Jose Puthenkulam
Kevin Baum	Adam Kerr	Kamlesh Rath
Izhar Bentov	Brian Kiernan	Maximilian Riegel
Rajesh Bhalla	Jeonghwi Kim	Chris Rogers
Sean Cai	Jung Won Kim	Kiseon Ryu
David Castelow	Yong Bum Kim	Andrew Sago
Giulio Cavalli	YoungKyun Kim	Atul Salvekar
Dean Chang	Itzik Kitroser	Randall Schwartz
Jae Hwan Chang	Changhoi Koo	Yossi Segal
Yong Chang	Lalit Kotecha	Radu Selea
Naftali Chayat	Margaret LaBrecque	Mohammad Shakouri
Rémi Chayer	Jonathan Labs	N.K. Shankaranarayanan
Aik Chindapol	Jules Pierre Lamoureux	Eli Shasha
Jaeweon Cho	Chang-jae Lee	James Simkins
Hyoungh-Jin Choi	Jae Hak Lee	Jung Je Son
Joey Chou	Seong Choon Lee	Yeong Moon Son
Jin Yong Chung	Yigal Leiba	Kenneth Stanwood
José Costa	Barry Lewis	Shawn Taylor
Mark Cudak	Xiaodong Li	Wen Tong
Frank Draper	John Liebetreu	Rainer Ullmann
John Dring	Hyounghsoo Lim	Mano Vafai
Lester Eastwood	Titus Lo	Eyal Verbin
Brian Eidson	Hui-Ling Lou	Frederick Vook
Carl Eklund	Heinz Lycklama	Arthur Wang
Yigal Eliaspur	Michael Lynch	Irving Wang
Roger Eline	Martin Lysejko	Lei Wang
Oren Elkayam	Seung Joo Maeng	Stanley Wang
Mo-Han Fong	David Maez	Alfred Wiczorek
Bogdan Franovici	Jeffrey Mandin	Hassan Yaghoobi
Avraham Freedman	Kevin Mankin	Vladimir Yanover
Mariana Goldhamer	Roger B. Marks	Chulsik Yoon
Reza Golshan	Russell McKown	Chang Wahn Yu
Qiang Guo	Scott Migaldi	Peiyang Zhu
	James Mollenauer	

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16e-2005 was prepared and finalized for IEEE Ballot:

Aditya Agrawal	Tal Kaitz	Greg Phillips
Baraa Al-Dabagh	Ofer Kelman	Kamlesh Rath
Mario Aliotta	Brian Kiernan	Gene Robinson
Eli Avivi	Itzik Kitroser	Randall Schwartz
Phillip Barber	Changhoi Koo	Yossi Segal
David Castelow	Jonathan Labs	Radu Selea
Dean Chang	Yigal Leiba	James Simkins
Naftali Chayat	Lingjie Li	Kenneth Stanwood
Rémi Chayer	John Liebetreu	Carl Stevenson
Brian Eidson	Hyoungsoo Lim	Shawn Taylor
Carl Eklund	Lars Lindh	David Trinkwon
Roger Eline	Heinz Lycklama	Rainer Ullmann
Avraham Freedman	Roger B. Marks	Eyal Verbin
Marianna Goldhammer	Russell McKown	Lei Wang
Zion Hadad	Andrew Middleton	Vladimir Yanover
David Johnston	Ronald Murias	Choong-il Yeh
Panyuh Joo	Robert Nelson	Chulsik Yoon

The following participated as nonmembers in the Working Group Letter Ballot for IEEE Std 802.16e-2005:

Chang-Jae Lee	Jeffrey Mandin	Jose Puthenkulam
---------------	----------------	------------------

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16-2004/Cor1-2005 was prepared and finalized for IEEE Ballot:

Ray Abrishami	Jiho Jang	Gunnar Nitsche
Aditya Agrawal	Jaeho Jeon	Paul Odlyzko
Baraa Al-Dabagh	Moo Ryong Jeong	Min Seok Oh
Mario Aliotta	Yong Seok Jin	Masoud Olfat
Dov Andelman	Brian Johnson	Shlomo Ovadia
Sanjeev Athalye	David Johnston	Joonho Park
Eli Avivi	Panyuh Joo	Pyung-Su Park
Raja Banerjea	Tal Kaitz	Youngsoo Park
Kevin Baum	Ravi Kalavakunta	Trevor Pearman
Izhar Bentov	Samuel Kang	Greg Phillips
Rajesh Bhalla	Ofer Kelman	Paul Piggins
Eckard Bogenfeld	Adam Kerr	Ambroise Popper
Sean Cai	Brian Kiernan	Jose Puthenkulam
David Castelow	Beomjoon Kim	Kamlesh Rath
Giulio Cavalli	Bong Ho Kim	Anthony Reid
Chan-Byoung Chae	Chong-kwon Kim	Eric Reifsnider
Dean Chang	Jaeyoel Kim	Russ Reynolds
Jae Hwan Chang	Jeong-Heon Kim	Maximilian Riegel
Sungcheol Chang	Jeonghwi Kim	Chris Rogers
Yong Chang	Jung Won Kim	Shane Rogers
Naftali Chayat	Min Sung Kim	Wonil Roh
Rémi Chayer	Ronny (Yong-Ho) Kim	Byung-Han Ryu
Tao Chen	Yong Bum Kim	Kiseon Ryu
Yuehua (Lucy) Chen	Young Kyun Kim	Andrew Sago
Aik Chindapol	Itzik Kitroser	Atul Salvekar
Jaehee Cho	Chris Knudsen	Randall Schwartz
Jaeweon Cho	Changhoi Koo	Christian Seagren
Kihyoung Cho	Havish Koorapaty	Yossi Segal
Seokheon Cho	Lalit Kotecha	Radu Selea
Hyoungh-Jin Choi	Denesh Krishnasamy	N.K. Shankaranarayanan
Joey Chou	Dongseung Kwon	Eli Shasha
Jin Young Chun	Margaret LaBrecque	James Simkins
Jin Yong Chung	Jonathan Labs	Jung Je Son
Kyuhyuk Chung	Jules Pierre Lamoureux	Yeong Moon Son
José Costa	Chang-jae Lee	Kenneth Stanwood
Mark Cudak	Jae Hak Lee	Shawn Taylor
Frank Draper	Sungjin Lee	Wen Tong
Lester Eastwood	Yigal Leiba	Rainer Ullmann
Carl Eklund	Barry Lewis	Mano Vafai
Yigal Eliaspur	Jun Li	Eyal Verbin
Roger Eline	Xiaodong Li	Frederick Vook
Torsten Fahldieck	Geunhwi Lim	Arthur Wang
Yonggang Fang	Hyoung Kyu Lim	Guo Qiang Wang
Mo-Han Fong	Hyoungsoo Lim	Irving Wang
Bogdan Franovici	Erik Lindskog	Jing Wang
Avraham Freedman	Titus Lo	Lei Wang
Nikhil Goel	Hui-Ling Lou	Stanley Wang
Mariana Goldhamer	Heinz Lycklama	Alfred Wiczorek
Reza Golshan	Michael Lynch	Geng Wu
Jin Guo	Martin Lysejko	Jun Wu
Qiang Guo	Seung Joo Maeng	Hassan Yaghoobi
Zion Hadad	David Maez	Ran Yaniv
Yung Hahn	Jeffrey Mandin	Vladimir Yanover
Jun Han	Roger B. Marks	Choong-Il Yeh
Jeff Harrang	Russell McKown	Kunmin Yeo
Haixiang He	Scott Migaldi	Chulsik Yoon
Zhaoyun (Laura) Huang	James Mollenauer	Wenzhong Zhang
John Humbert	Ollivier Mont-Reynaud	Keqiang Zhu
Seung Ku Hwang	Ronald Murias	Peiyang Zhu
	K. S. Natarajan	

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16-2004/Cor1-2005 was prepared and finalized for IEEE Ballot:

Ray Abrishami	Pieter-Paul Giesberts	Yongmao Li
Edward Agis	Nikhil Goel	Gaspard Licitra
Aditya Agrawal	Mariana Goldhamer	Aeri Lim
Siavash Alamouti	Reza Golshan	Geunhwi Lim
Murtaza Ali	David Grandblaise	Hyoung Kyu Lim
Mario Aliotta	Qiang Guo	Hyoungsoo Lim
Dov Andelman	Zion Hadad	Zhibin Lin
Gordon Antonello	Jun Han	Titus Lo
Eli Avivi	Jung Ho Han	Hui-Ling Lou
Phillip Barber	Seishi Hanaoka	Heinz Lycklama
Kevin Baum	Jeff Harrang	Michael Lynch
Rajesh Bhalla	Haixiang He	Steve Ma
Yufei Blankenship	Gregory Scott Henderson	Seung Joo Maeng
Eckard Bogenfeld	Michael Hoghooghi	David Maez
Achim Brandt	Chang-Lung Hsiao	Mahesh Makhijani
Thomas Brown	Haiming Huang	Jeffrey Mandin
Sean Cai	John Humbert	Roger B. Marks
James Carlo	Yerang Hur	David McGinniss
Giulio Cavalli	InSeok Hwang	Scott Migaldi
Jaesun Cha	Bin-Chul Ihm	James Mollenauer
Chan-Byoung Chae	Jiho Jang	Roland Muenzner
Dean Chang	Jaeho Jeon	Willem Mulder
Jae Hwan Chang	David Johnston	Ronald Murias
Sungcheol Chang	Panyuh Joo	Kenichi Nakamura
Yong Chang	Hyunjeong Kang	K.S. Natarajan
Naftali Chayat	Ivy Kelly	Mitsuo Nohara
RÉmi Chayer	Ofer Kelman	Paul Odlyzko
Jennifer Chen	Brian Kiernan	Shlomo Ovardia
Yuehua (Lucy) Chen	Beomjoon Kim	David Paranchych
Aik Chindapol	Bong Ho Kim	Youngsoo Park
Hua (Mary) Chion	Byoung-Jo Kim	Roger Peterson
Jaehee Cho	Dae-Joong Kim	Bonnie Petti
Jaeweon Cho	Jaeyoel Kim	Greg Phillips
Kihyoung Cho	Jung Won Kim	Paul Piggini
Seije Cho	Min Sung Kim	Ambroise Popper
Seokheon Cho	Ronny (Yong-Ho) Kim	Scott Probasco
Hyoung-Jin Choi	Youngho Kim	Jose Puthenkulam
Yang-Seok Choi	Itzik Kitroser	Nanjian (Jeff) Qian
Joey Chou	Chris Knudsen	Hongyun Qu
Jin Young Chun	Changhoi Koo	Shyamal Ramachandran
JosÉ Costa	Havish Koorapaty	Frank Rayal
Mark Cudak	Lalit Kotecha	Eric Reifsnider
Shujun Dang	Toshiyuki Kuze	Francis Retnasothie
Wim Diepstraten	Dong Seung Kwon	Maximilian Riegel
Frank Draper	Jonathan Labs	Wonil Roh
Krzysztof Dudzinski	Kari Laihonen	Herbert Ruck
Lester Eastwood	Jules Pierre Lamoureux	Kiseon Ryu
Tomas Edler	Chang-jae Lee	Andrew Sago
Carl Eklund	Chi-Chen Lee	Yousuf Saifullah
Yigal Eliaspur	Jae Hak Lee	Kenji Saito
Frank Exeler	Mihyun Lee	Atul Salvekar
Torsten Fahldieck	Sungjin Lee	J'rg Schmidt
Yonggang Fang	Yigal Leiba	Christian Seagren
Peretz Feder	Jia-Ru Li	Yossi Segal
Dazi Feng	Jiang Li	Radu Selea
Mo-Han Fong	Kemin Li	N.K. Shankaranarayanan
Avraham Freedman	Li Li	Eliyahu Shasha
Yan Fu	Thomas Li	Gang Shen
Mike Geipel	Xiaodong Li	Yabing Shen

James Simkins
Sten Sjoberg
Jung Je Son
Yeong Moon Son
Kenneth Stanwood
Kyungjoo Suh
Xiangguo Tang
Yongjoo Tcha
Wen Tong
Shiau-He Tsai
Rainer Ullmann
Mano Vafai
Lucia Valbonesi
Richard Van Leeuwen
Eyal Verbin
Dorin Viorel
Frederick Vook

Arthur Wang
Fan Wang
Guo qiang Wang
Irving Wang
Lei Wang
Stanley Wang
Mattias Wennstrom
Alfred Wiczorek
Geng Wu
Jun Wu
Xuyong Wu
David Xiang
Ling Xu
Shanshan Xu
Hassan Yaghoobi
Weidong Yang

Yunsong Yang
Ran Yaniv
Vladimir Yanover
Choong Il Yeh
Hujun Yin
Chulsik Yoon
Soon Young Yoon
Aeran Youn
Jungnam Yun
Mi-Young Yun
Nader Zein
Wenfeng Zhang
Zhijian Zhang
Ruobin Zheng
Qun Zhou
Peiying Zhu
Ilan Zohar

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16g-2007 was prepared and finalized for IEEE Ballot:

Ray Abrishami	Nikhil Goel	Aeri Lim
Edward Agis	Mariana Goldhamer	Geunhwi Lim
Aditya Agrawal	Reza Golshan	Hyoungh Kyu Lim
Siavash Alamouti	David Grandblaise	Hyounghsoo Lim
Murtaza Ali	Qiang Guo	Zhibin Lin
Mario Aliotta	Zion Hadad	Titus Lo
Dov Andelman	Jun Han	Hui-Ling Lou
Gordon Antonello	Jung Ho Han	Heinz Lycklama
Eli Avivi	Seishi Hanaoka	Michael Lynch
Phillip Barber	Jeff Harrang	Steve Ma
Kevin Baum	Haixiang He	Seung Joo Maeng
Rajesh Bhalla	Gregory Scott Henderson	David Maez
Yufei Blankenship	Michael Hoghooghi	Mahesh Makhijani
Eckard Bogenfeld	Chang-Lung Hsiao	Jeffrey Mandin
Achim Brandt	Haiming Huang	Roger B. Marks
Thomas Brown	John Humbert	David McGinniss
Sean Cai	Yerang Hur	Scott Migaldi
James Carlo	InSeok Hwang	James Mollenauer
Giulio Cavalli	Bin-Chul Ihm	Roland Muenzner
Jaesun Cha	Jiho Jang	Willem Mulder
Chan-Byoung Chae	Jaeho Jeon	Ronald Murias
Dean Chang	David Johnston	Kenichi Nakamura
Jae Hwan Chang	Panyuh Joo	K.S. Natarajan
Sungcheol Chang	Hyunjeong Kang	Mitsuo Nohara
Yong Chang	Ivy Kelly	Paul Odlyzko
Naftali Chayat	Ofer Kelman	Shlomo Ovardia
Rémi Chayer	Brian Kiernan	David Paranchych
Jennifer Chen	Beomjoon Kim	Youngsoo Park
Yuehua (Lucy) Chen	Bong Ho Kim	Roger Peterson
Aik Chindapol	Byoung-Jo Kim	Bonnie Petti
Hua (Mary) Chion	Dae-Joong Kim	Greg Phillips
Jaehye Cho	Jaeyoel Kim	Paul Piggini
Jaeweon Cho	Jung Won Kim	Ambroise Popper
Kihyoung Cho	Min Sung Kim	Scott Probasco
Seije Choi	Ronny (Yong-Ho) Kim	Jose Puthenkulam
Seokheon Cho	Youngho Kim	Nanjian (Jeff) Qian
Hyoungh-Jin Choi	Itzik Kitroser	Hongyun Qu
Yang-Seok Choi	Chris Knudsen	Shyamal Ramachandran
Joey Chou	Changhoi Koo	Frank Rayal
Jin Young Chun	Havish Koorapaty	Eric Reifsnider
José Costa	Lalit Kotecha	Francis Retnasothie
Mark Cudak	Toshiyuki Kuze	Maximilian Riegel
Shujun Dang	Dong Seung Kwon	Wonil Roh
Wim Diepstraten	Jonathan Labs	Herbert Ruck
Frank Draper	Kari Laihonen	Kiseon Ryu
Krzysztof Dudzinski	Jules Pierre Lamoureux	Andrew Sago
Lester Eastwood	Chang-jae Lee	Yousuf Saifullah
Tomas Edler	Chi-Chen Lee	Kenji Saito
Carl Eklund	Jae Hak Lee	Atul Salvekar
Yigal Eliaspur	Mihyun Lee	Jörg Schmidt
Frank Exeler	Sungjin Lee	Christian Seagren
Torsten Fahldieck	Yigal Leiba	Yossi Segal
Yonggang Fang	Jia-Ru Li	Radu Selea
Peretz Feder	Jiang Li	N.K. Shankaranarayanan
Dazi Feng	Kemin Li	Eliyahu Shasha
Mo-Han Fong	Li Li	Gang Shen
Avraham Freedman	Thomas Li	Yabing Shen
Yan Fu	Xiaodong Li	James Simkins
Mike Geipel	Yongmao Li	Sten Sjoberg
Pieter-Paul Giesberts	Gaspard Licitra	Jung Je Son

Yeong Moon Son
Kenneth Stanwood
Kyungjoo Suh
Xiangguo Tang
Yongjoo Tcha
Wen Tong
Shiau-He Tsai
Rainer Ullmann
Mano Vafai
Lucia Valbonesi
Richard Van Leeuwen
Eyal Verbin
Dorin Viorel
Frederick Vook
Arthur Wang
Fan Wang

Guo qiang Wang
Irving Wang
Lei Wang
Stanley Wang
Mattias Wennstrom
Alfred Wiczorek
Geng Wu
Jun Wu
Xuyong Wu
David Xiang
Ling Xu
Shanshan Xu
Hassan Yaghoobi
Weidong Yang
Yunsong Yang

Ran Yaniv
Vladimir Yanover
Choong Il Yeh
Hujun Yin
Chulsik Yoon
Soon Young Yoon
Aeran Youn
Jungnam Yun
Mi-Young Yun
Nader Zein
Wenfeng Zhang
Zhijian Zhang
Ruobin Zheng
Qun Zhou
Peiying Zhu
Ilan Zohar

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16j-2009 was prepared and finalized for IEEE Ballot:

Edward Agis	Peretz Feder	Itzik Kitroser
Sassan Ahmadi	Shulan Feng	Ali Koc
Dong Hyun Ahn	Mo-Han Fong	Havish Koorapaty
JunBae Ahn	Avraham Freedman	Thanasis Korakis
Dov Andelman	I-Kang Fu	Gokhan Korkmaz
Reza Arefi	Dan Gal	Toshiyuki Kuze
Phillip Barber	Pieter-Paul Giesberts	Byung-Jae Kwak
Kevin Baum	Rob Glassford	Jin Sam Kwak
Adrian Boariu	Mariana Goldhamer	Dong Seung Kwon
Eckard Bogenfeld	Reza Golshan	Yeong-Hyeon Kwon
Achim Brandt	David Grandblaise	Jonathan Labs
Dale Branlund	Daqing Gu	Pierre Lamoureux
Terri Brooks	Zion Hadad	Hyun Lee
Sean Cai	GeneBeck Hahn	Hyunjeong Lee
James Carlo	Shkumbin Hamiti	Jin Lee
Jaesun Cha	Jung Ho Han	Ki-Dong Lee
Suchang Chae	Seishi Hanaoka	Kyu Ha Lee
Jae Hwan Chang	Keisuke Higuchi	Mi Hyun Lee
Sungcheol Chang	Minnie Ho	Sang-Ho Lee
Remi Chayer	Chang-Lung Hsiao	Seung Joon Lee
David Chen	Ching-Tarng Hsieh	Sukwoo Lee
Wei-Peng Chen	Yu-Tao Hsieh	Wookbong Lee
Paul Cheng	Hsien-Tsung Hsu	Yong Su Lee
Aik Chindapol	Yuan-Ying Hsu	Youn-Tai Lee
Hua (Mary) Chion	Teck Hu	Yung-Ting Lee
Jaehye Cho	Cancan Huang	Matty Levanda
Jaeweon Cho	Junhong Hui	Guangjie Li
Kihyoung Cho	John Humbert	Jiang Li
Myeon-Gyun Cho	Yerang Hur	Jun Li
Hokyu Choi	In Seok Hwang	Richard Li
Hyoung-Jin Choi	Bin-Chul Ihm	Shaohua Li
Hyung-Nam Choi	Tetsu Ikeda	Thomas Li
In-Kyeong Choi	Tetsushi Ikegami	Aeri Lim
Jinsoo Choi	Jaehyuk Jang	Geunhwi Lim
Joonyoung Choi	Klutto Milleth Jeniston Deviraj	Hyoung Kyu Lim
Yang-Seok Choi	Hyung Joon Jeon	Kwangjae Lim
Yong-Hoon Choi	Moo Ryong Jeong	Tzu-Ming Lin
Chie Ming Chou	Sunggeun Jin	Zhibin Lin
Joey Chou	Brian Johnson	Stefan Lindgren
Jerry Chow	Kerstin Johnsson	Hang Liu
Jimmy Chui	David Johnston	Michael Livschitz
Takafumi Chujo	Panyuh Joo	Titus Lo
Jin Young Chun	Young-Ho Jung	Kanchei Loa
Young-Uk Chung	Takeo Kanai	Jianmin Lu
Erik Colban	Hyunjeong Kang	Yanling Lu
David Comstock	Seung Hyun Kang	Michael Lynch
Jose Costa	Ofer Kelman	Mohammad Madihian
Steven Crowley	Brian Kiernan	David Maez
Mark Cudak	Bong Ho Kim	Giovanni Maggi
George Cummings	Changkyoon Kim	Shashikant Maheshwari
Pranav Dayal	Hyung Kee Kim	Ronald Mao
Carlos De Segovia	Kyeongsoo Kim	Djamal-Eddine Meddour
Upkar Dhaliwal	Ronny (Yong-Ho) Kim	Scott Migaldi
Yoshiharu Doi	Sang Youb Kim	Chan Ho Min
Lester Eastwood	Sungkyung Kim	Shantidev Mohanty
Carl Eklund	Young Kyun Kim	Andreas Molisch
Per Elmdahl	Young-Il Kim	James Mollenauer
Michael Erlihson	Young-jae Kim	Ollivier Mont-Reynaud
Yu-Chang Eun	Youngho Kim	Sungho Moon
Torsten Fahldieck	Takaaki Kishigami	Willem Mulder

Yukimasa Nagai
Ayman Naguib
Kenichi Nakamura
Michiharu Nakamura
Eric Njedjou
Minseok Noh
John Norin
Paul Odlyzko
Changyoon Oh
Min-Seok Oh
Masato Okuda
Kim Olszewski
Philip Orlik
David Paranchych
D. S. Park
Jeongho Park
Vijay Patel
Roger Peterson
Paul Piggini
Robert Popoli
Darcy Poulin
Scott Probasco
Xin Qi
Nanjian (Jeff) Qian
Fei Qin
Hongyun Qu
Arvind Raghavan
Shyamal Ramachandran
Ranga K. Reddy
Fang-Ching Ren
Maximilian Riegel
Kwanhee Roh
Wonil Roh
Zhigang Rong
Adel Rouz
Philip Rubin
Herbert Ruck
Kiseon Ryu
Aryan Saed
Yousuf Saifullah
Kenji Saito
Summeet Sandhu

Ioannis Sarris
Joerg Schaepperle
Gary Schlanger
Gamini Senarath
Jigar Shah
Zheng Shang
Ariel Sharon
Wern-Ho Sheen
Peretz Shekalim
Gang Shen
Matthew Sherman
Jaejeong (Brian) Shim
D. J. Shyy
James Simkins
Kathiravetpillai Sivanesan
Sten Sjoberg
Jung Je Son
Yeongmoon Son
Ting-Chen (Tom) Song
Young Seog Song
Roshni Srinivasan
Kenneth Stanwood
David Steer
Aram Sukiasyan
Sheng Sun
Yong Sun
Jaroslav J. Sydir
John Sydor
Mineo Takai
Yukihiro Takatani
Pek Yew Tan
Jeffrey Tao
Rakesh Taori
Shawn Taylor
Koon Hoo Teo
Timothy Thome
Wen Tong
Arnaud Tonnerre
Shiau-He Tsai
Rainer Ullmann
David Urban
Sunil Vadgama
Lucia Valbonesi

Richard van Leeuwen
Rath Vannithamby
Muthaiah Venkatachalam
Dorin Viorel
Eugene Visotsky
Frederick Vook
Arthur Wang
Guo Qiang Wang
Lei Wang
Michael Wang
Shu-Shaw Wang
Stanley Wang
Yanhong Wang
Fujio Watanabe
Alfred Wiecezorek
Geng Wu
Xuyong Wu
Yingzhe Wu
David Xiang
Chengjie Xie
Hua Xu
Ling Xu
Akiyoshi Yagi
Jen-Shun Yang
Rongzhen Yang
Xiangying Yang
Yunsong Yang
Vladimir Yanover
Hua-Chiang Yin
Hujun Yin
Chulsik Yoon
Aeran Youn
Jungnam Yun
Sangboh Yun
Masaaki Yuza
Jinyun Zhang
Kaibin Zhang
Hongming Zheng
Hua Zhou
Yuefeng Zhou
Chenxi Zhu

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16h-2010 was prepared and finalized for IEEE Ballot:

Edward Agis	Hyung Joon Jeon	Changyoon Oh
Sassan Ahmadi	Sunggeun Jin	Min-Seok Oh
JunBae Ahn	Panyuh Joo	Philip Orlik
Dov Andelman	Young-Ho Jung	David Paranchych
Reza Arefi	Hyunjeong Kang	DS Park
Phillip Barber	Ofer Kelman	Jeongho Park
Kevin Baum	Brian Kiernan	Vijay Patel
Adrian Boariu	Changkyoon Kim	Roger Peterson
Terri Brooks	Sang Youb Kim	Paul Piggin
Sean Cai	Young Kyun Kim	Jose Puthenkulam
James Carlo	Young-jae Kim	Nanjian (Jeff) Qian
Jaesun Cha	Youngho Kim	Fei Qin
Suchang Chae	Takaaki Kishigami	Hongyun Qu
Jae Hwan Chang	Itzik Kitroser	Shyamal Ramachandran
Naftali Chayat	J. Klutto Milleth	Ranga Reddy
Rémi Chayer	Ali Koc	Fang-Ching Ren
Wei-Peng Chen	Changhoi Koo	Maximilian Riegel
Paul Cheng	Thanasis Korakis	Kwanhee Roh
Aik Chindapol	Toshiyuki Kuze	Wonil Roh
Jaehye Cho	Jin-Sam Kwak	Zhigang Rong
Jaeweon Cho	Yeong-Hyeon Kwon	Adel Rouz
Myeon-Gyun Cho	Jonathan Labs	Kiseon Ryu
Hokyuu Choi	Pierre Lamoureux	Yousuf Saifullah
Hyoung-Jin Choi	Hyun Lee	Ioannis Sarris
Joonyoung Choi	Ki-Dong Lee	Joseph Schumacher
Yang-Seok Choi	Kyu Ha Lee	Gamini Senarath
Chie Ming Chou	Mi Hyun Lee	Zheng Shang
Joey Chou	Sang-Ho Lee	Ariel Sharon
Takafumi Chujo	Seung Joon Lee	Wern-Ho Sheen
Jin Young Chun	Sukwoo Lee	Peretz Shekalim
Erik Colban	Youn-Tai Lee	Jaejeong (Brian) Shim
David Comstock	Yung-Ting Lee	D. J. Shyy
José Costa	Jiang Li	Kathiravetpillai Sivanesan
Mark Cudak	Jun Li	Jung Je Son
Upkar Dhaliwal	Richard Li	Yeongmoon Son
Yoshiharu Doi	Aeri Lim	Ting-Chen (Tom) Song
Lester Eastwood	Geunhwi Lim	Roshni Srinivasan
Carl Eklund	Hyoung Kyu Lim	Kenneth Stanwood
Michael Erlihson	Kwangjae Lim	Aram Sukiasyan
Yu-Chang Eun	Tzu-Ming Lin	Sheng Sun
Shulan Feng	Hang Liu	Yong Sun
Mo-Han Fong	Michael Livschitz	Jaroslav J Sydir
Avraham Freedman	Jianmin Lu	John Sydor
I-Kang Fu	Yanling Lu	Mineo Takai
Pieter-Paul Giesberts	Michael Lynch	Yukihiro Takatani
Rob Glassford	Mohammad Madihian	Jeffrey Tao
Mariana Goldhamer	David Maez	Rakesh Taori
David Grandblaise	Giovanni Maggi	Shawn Taylor
Zion Hadad	Shashikant Maheshwari	Wen Tong
Jung Ho Han	Roger B. Marks	Arnaud Tonnerre
Keisuke Higuchi	Scott Migaldi	Rainer Ullmann
Chang-Lung Hsiao	Shantidev Mohanty	David Urban
Ching-Tarn Hsieh	James Mollenauer	Sunil Vadgama
Yu-Tao Hsieh	Ollivier Mont-Reynaud	Lucia Valbonesi
Hsien-Tsung Hsu	Sungho Moon	Richard van Leeuwen
Yuan-Ying Hsu	Yukimasa Nagai	Dorin Viorel
In Seok Hwang	Kenichi Nakamura	Eugene Visotsky
Bin-Chul Ihm	Michiharu Nakamura	Frederick Vook
Tetsushi Ikegami	Mitsuo Nohara	Arthur Wang
Jaehyuk Jang	John Norin	Guo Qiang Wang

Lei Wang
Michael Wang
Stanley Wang
Yanhong Wang
Alfred Wiczorek
Geng Wu
Xuyong Wu
David Xiang

Chengjie Xie
Hua Xu
Ling Xu
Akiyoshi Yagi
Rongzhen Yang
Xiangying Yang
Yunsong Yang
Vladimir Yanover
Hua-Chiang Yin

Aeran Youn
Sangboh Yun
Masaaki Yuza
Jinyun Zhang
Hua Zhou
Yuefeng Zhou
Chenxi Zhu
Peiying Zhu

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16m-2011 was prepared and finalized for IEEE Ballot:

Rajni Agarwal	Chengyan Feng	Sangheon Kim
Anil Agiwal	Mo-Han Fong	Sungkyung Kim
Sassan Ahmadi	I-Kang Fu	Taeyoung Kim
Hassan Al-Kanani	Jong-Kae (JK) Fwu	Won Ik Kim
Xavier Ambroise	Dan Gal	Takaaki Kishigami
Dov Andelman	Mariana Goldhamer	J. Klutto Milleth
Ramesh Annavajjala	Yanfeng Guan	Ali Koc
Tsuguhide Aoki	Michael Gundlach	Thanasis Korakis
Reza Arefi	Zion Hadad	Gokhan Korkmaz
Youngkyo Baek	GeneBeck Hahn	Kiran Kumar Kuchi
Phillip Barber	Seishi Hanaoka	Ping-Heng Kuo
Harry Bims	Tom Harel	Jin-Sam Kwak
Erez Biton	Shigenori Hayase	Dong Seung Kwon
Adrian Boyer	William Hillery	Young Hoon Kwon
Sean Cai	Nageen Himayat	Jonathan Labs
Jaesun Cha	Chieh Yuan Ho	Byung Moo Lee
Suchang Chae	Chung-Lien Ho	Howon Lee
Sung-Cheol Chang	Ying-Chuan Hsiao	Hyun Lee
YoungBin Chang	Ching-Tarn Hsieh	HyunWoo Lee
Yu-Hao Chang	Yu-Tao Hsieh	Jeong Julie Lee
Naftali Chayat	Chun-Yen Hsu	Jin Lee
Cheng-Ming Chen	Chung-Hsien Hsu	Ju Seung Lee
Chiu-Wen Chen	Jen-Yuan Hsu	Ki-Dong Lee
Mei-Dai Chen	Yi Hsuan	Mi Hyun Lee
Wei-Peng Chen	Cancan Huang	Sukwoo Lee
Whai-En Chen	Din Hwa Huang	Sungjin Lee
Yih-Shen Chen	Lei Huang	Wookbong Lee
Yung-Han Chen	Jie Hui	Yang-Han Lee
Yuqin Chen	Junhong Hui	Youn-Tai Lee
Paul Cheng	Yerang Hur	Yung-Ting Lee
Ray-Guang Cheng	Bin-Chul Ihm	Guangjie Li
Shih-Yuan Cheng	Tetsu Ikeda	Ying Li
Hua (Mary) Chion	Satoshi Imata	Zexian Li
Chun-Yuan Chiu	Yih Guang Jan	Pei-Kai Liao
HanGyu Cho	Jaehyuk Jang	Junsung Lim
Jaehye Cho	Junghoon Jee	Kwangjae Lim
Jaeweon Cho	Baowei Ji	Chih-Yuan Lin
Youngbo Cho	Lei Jin	Hsin-Piao Lin
Hokyu Choi	Sunggeun Jin	Kuhn-Chang Lin
Jinsoo Choi	Kerstin Johnsson	Yi-Ting Lin
Joonyoung Choi	Kaushik Josiam	Hang Liu
Yang-Seok Choi	Rong-Terng Juang	Yang Liu
Chao-Chin Chou	Inuk Jung	Michael Livschitz
Chie Ming Chou	Soojung Jung	Kanchei Loa
Ching-Chun Chou	Heewon Kang	Jianmin Lu
Joey Chou	Hyunjeong Kang	Kaiying Lv
Jerry Chow	Minsuk Kang	Mohammad Madhian
Ming-Hsueh Chuang	Seunghyun Kang	Andreas Maeder
Jin Young Chun	Hajime Kanzaki	Alexander Maltsev
Russell Chung	Chien-Yu Kao	Ronald Mao
Bruno Clerckx	Tsuguo Kato	Roger B. Marks
Steven Crowley	Mohammad Khojastepour	Gerard Marque-Pucheu
Mark Cudak	Alexey Khoryaev	Arif Maskatia
Alexey Davydov	Brian Kiernan	Wataru Matsumoto
Kamran Etemad	Eunkyung Kim	David Mazzaresse
Yu-Chang Eun	Jeong Gon Kim	Sean McBeath
Linghang Fan	Jihyung Kim	Djamal-Eddine Meddour
Huiying Fang	Juhee Kim	Scott Migaldi
Yu-Chuan Fang	Namgi Kim	Shantidev Mohanty
Peretz Feder	Ronny (Yong-Ho) Kim	Andreas Molisch

Sungho Moon
Ronald Murias
Keiichi Nakatsugawa
Huaning Niu
Mitsuo Nohara
Min-Seok Oh
Masato Okuda
Kim Olszewski
Ryoji Ono
Philip Orlik
Apostolos Papathanassiou
Giwon Park
Hyungho Park
Jeongho Park
Jisoo Park
Sung-Eun Park
Zhouyue Pi
Kevin Power
Scott Probasco
Jose Puthenkulam
Hongyun Qu
Sudhir Ramakrishna
Rong Ran
Ranga Reddy
Fang-Ching Ren
Maximilian Riegel
Kwanhee Roh
Wonil Roh
Zhigang Rong
Herbert M. Ruck
Kiseon Ryu
Yousuf Saifullah
Luciano Sarperi
Shahab Sayeedi
Joerg Schaepperle
Joseph Schumacher
Ji-Yun Seol
Ahmed Shalash
Peretz Shekalim
Jaejeong (Brian) Shim

Wooram Shin
Takashi Shono
Sten Sjoberg
Tricci So
Jung Je Son
Yeongmoon Son
Ting-Chen (Tom) Song
Young Seog Song
Roshni Srinivasan
Kenneth Stanwood
Bo Sun
Hongmei Sun
Li-Hsiang Sun
Yong Sun
Doo-hyun Sung
Jaroslaw J Sydir
Anup Talukdar
Yang Tang
Jeffrey Tao
Ming-Hung Tao
Rakesh Taori
Shawn Taylor
Yongjoo Tcha
Arnaud Tonnerre
Chang-Lan Tsai
Jiann-An Tsai
Tsung-Yu Tsai
Yi-Hsueh Tsai
Fan Shuo Tseng
Hsien-Wei Tseng
Stavros Tzavidas
Sunil Vadgama
Rath Vannithamby
Muthaiah Venkatachalam
Frederick Vook
Kenneth Walker
Arthur Wang
Chun-Yen Wang
Hai Wang
Jiacheng Wang
Lei Wang

Li Wang
Ping Wang
Yanhong Wang
Fujio Watanabe
Yoshikazu Watanabe
Hung-Yu Wei
Ciouping Wu
Jia-Hao Wu
Qi Wu
Changlong Xu
Hua Xu
Jin Xu
Ling Xu
Hassan Yaghoobi
Chang Feng Yang
Chih-Cheng Yang
Feng-Ming Yang
Rongzhen Yang
Xiangying Yang
Yunsong Yang
Vladimir Yanover
Hua-Chiang Yin
Hujun Yin
Hwasun Yoo
Isamu Yoshii
Hyunkyu Yu
Young Soo Yuk
Jungnam Yun
Nader Zein
Eldad Zeira
Jie Zhang
Zheng Zhao
Xufeng Zheng
Yan-Xiu Zheng
Hua Zhou
Lei Zhou
Chenxi Zhu
Jing Zhu
Peiying Zhu
Yuan Zhu

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16-2012 was prepared and finalized for IEEE Ballot:

Anil Agiwal	Brian Kiernan	Fei Qin
Hanan Ahmed	Eunkyung Kim	Sudhir Ramakrishna
Hassan Al-Kanani	Hokyung Kim	Wonil Roh
Youngkyo Baek	Jeongki Kim	Kiseon Ryu
Phillip Barber	Namgi Kim	Sam Sambasivan
Inbar Bratspiess	Ronny (Yong-Ho) Kim	Ji-Yun Seol
Jaesun Cha	Sangheon Kim	Peretz Shekalim
Sungcheol Chang	Seokki Kim	Matthew Sherman
YoungBin Chang	Taeyoung Kim	Takashi Shono
Chiu-Wen Chen	Jin Sam Kwak	Jung Je Son
HanGyu Cho	Eunjong Lee	Yeongmoon Son
Hee Jeong Cho	Hyun Lee	Mineo Takai
Jaeweon Cho	Jin Lee	Ming-Hung Tao
Youngbo Cho	Yang-Han Lee	Joseph Teo
Jinsoo Choi	Honggang Li	Alessandro Triglia
Ching-Chun Chou	Ying Li	Tsung-Yu Tsai
Jin Young Chun	Chiwoo Lim	Hsien-Wei Tseng
Yu-Chuan Fang	Yi-Ting Lin	Arthur Wang
Dan Gal	Lu Liru	Hai Wang
Tim Godfrey	Andreas Maeder	Haiguang Wang
Anh Tuan Hoang	Ronald Mao	Lei Wang
Vinh-Dien Hoang	Shantidev Mohanty	Limei Wang
Ying-Chuan Hsiao	Ronald Murias	Hung-Yu Wei
Chun-Yen Hsu	Anshuman Nigam	Xiangying Yang
Satoshi Imata	Mitsuo Nohara	Wai Leong Yeow
Yih Guang Jan	Masayuki Oodo	Hyunkyu Yu
Kaushik Josiam	Giwon Park	Nader Zein
Inuk Jung	Jeongho Park	Eldad Zeira
Soojung Jung	Jisoo Park	Xin Zhang
Heewon Kang	Jaya Shankar Pathmasuntharam	Lei Zhou
Hyunjeong Kang	Jose Puthenkulam	Mingtuo Zhou

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16p-2012 was prepared and finalized for IEEE Ballot:

Anil Agiwal	Brian Kiernan	Fei Qin
Hanan Ahmed	Eunkyung Kim	Sudhir Ramakrishna
Hassan Al-Kanani	Hokyung Kim	Wonil Roh
Youngkyo Baek	Jeongki Kim	Kiseon Ryu
Phillip Barber	Nangki Kim	Sam Sambasivan
Inbar Bratspiess	Ronny (Yong-Ho) Kim	Ji-Yun Seol
Jaesun Cha	Sangheon Kim	Peretz Shekaim
Sungcheol Chang	Seokki Kim	Matthew Sherman
YoungBin Chang	Taeyoung Kim	Takashi Shono
Chiu-Wen Chen	Jin Sam Kwak	Jung Je Son
HanGyu Cho	Eunjong Lee	Yeongmoon Son
Hee Jeong Cho	Hyun Lee	Mineo Takai
Jaeweon Cho	Jin Lee	Ming-Hung Tao
Youngbo Cho	Yang-Han Lee	Joseph Teo
Jinsoo Choi	Honggang Li	Alessandro Triglia
Ching-Chun Chou	Ying Li	Tsung-Yu Tsai
Jin Young Chun	Chiwoo Lim	Hsien-Wei Tseng
Yu-Chuan Fang	Yi-Ting Lin	Arthur Wang
Dan Gal	Lu Liru	Hai Wang
Tim Godfrey	Andreas Maeder	Haiguang Wang
Anh Tuan Hoang	Ronald Mao	Lei Wang
Vinh-Dien Hoang	Shantidev Mohanty	Limei Wang
Ying-Chuan Hsiao	Ronald Murias	Hung-Yu Wei
Chun-Yen Hsu	Anshuman Nigam	Xiangying Wang
Satoshi Imata	Mitsuo Nohara	Wai Leong Yeow
Yih Guang Jan	Masayuki Oodo	Hyunkyu Yu
Kaushik Josiam	Giwon Park	Nader Zein
Inuk Jung	Jeongho Park	Eldad Zeira
Soojung Jung	Jisoo Park	Xin Zhang
Heewon Kang	Jaya Shankar Pathmasuntharam	Lei Zhou
Hyunjeong Kang	Jose Puthenkulam	Mingtuo Zhou

The following members of the IEEE 802.16 Working Group on Broadband Wireless Access participated in the Working Group Letter Ballot in which IEEE Std 802.16n-2013 was prepared and finalized for IEEE Ballot:

Hassan Al-Kanani	Hyunjeong Kang	Takashi Shono
Phillip Barber	Brian Kiernan	Rakesh Taori
Harry Bims	Eunkyung Kim	Joseph Teo
Inbar Bratspiess	Seokki Kim	Alessandro Triglia
Jaesun Cha	Anseok Lee	Arthur Wang
Sung-Cheol Chang	Hyun Lee	Haiguang Wang
Erik Colban	Honggang Li	Lei Wang
Yu-Chuan Fang	Lu Liru	Hung-Yu Wei
Dan Gal	Andreas Maeder	Wai Leong Yeow
Tim Godfrey	Roger B. Marks	Nader Zein
Anh Tuan Hoang	Shantidev Mohanty	Eldad Zeira
Vinh Dien Hoang	Ron Murias	Xin Zhang
Ying-Chuan Hsiao	Masayuki Oodo	Shoukang Zheng
Chun-Yen Hsu	Jisoo Park	Yan-Xiu Zheng
Satoshi Imata	Jaya Shankar Pathmasuntharam	Lei Zhou
Soojung Jung	Fei Qin	Ming-Tuo Zhou
	Sam Sambasivan	

Introduction

This introduction is not part of IEEE Std 802.16q-2015, IEEE Standard for Air Interface for Broadband Wireless Access Systems—Amendment 3: Multi-tier Networks.

This amendment specifies support for Multi-tier Networks. As of the publication date, the current applicable version of IEEE Std 802.16 is IEEE Std 802.16-2012, as amended by IEEE Std 802.16p-2012 and IEEE Std 802.16n-2013, and IEEE Std 802.16q-2015.

Conformance test methodology

The multipart conformance test documents for IEEE Std 802.16 are designated by “IEEE Standard 802.16/ConformanceXX.”

Contents

1.	Overview.....	2
1.9	Support for Mmulti-tier Nnetworks.....	2
3.	Definitions	3
4.	Abbreviations and acronyms	4
6.	MAC common part sublayer.....	5
6.3.2	MAC PDU formats	5
6.3.2.3	MAC management messages.....	5
10.	Parameters and constants	16
11.	TLV encodings	17
11.1	Common encodings	17
11.1.19	CSGID	17
11.3	UCD management message encodings.....	17
11.3.1	UCD channel encodings	17
11.4.1	DCD management encodings	17
11.8	SBC-REQ/RSP management message encodings	20
11.8.25	Multi-BS CT support	20
11.18	MOB_NBR-ADV management message encodings.....	21
11.18.5	Neighbor FA information	21
11.19	MOB_SCN-REP management message encodings.....	21
11.19.3	Neighbor request.....	21
11.19.4	Scanning result.....	22
11.20	MOB_SCN-REQ/RSP message encodings	22
11.20.4	Recommended SBS information	22
11.33	IM-CT-CH-REQ management encodings	23
11.34	IM-CT-CH-RSP management encodings	24
14.	Management interface and procedures	26
14.1	Service primitive template	26
14.1.1	Universal naming schema for SAP service primitive	26
14.1.2	SAP service primitive object format.....	27
14.1.2.1	M-SAP/C-SAP operation service primitive.....	27
14.1.2.2	M-SAP/C-SAP notification service primitive	28
14.1.3	SAP service primitive flow diagram template.....	29
14.2	Management and control functions.....	30
14.2.12	SBS power management	30
14.2.12.1	M-BPM-REQ.....	31
14.2.12.2	M-BPM-RSP.....	34
14.2.13	Interference management.....	36
14.2.13.1	C-IM-REQ	38
14.2.13.2	C-IM-RSP	46
14.2.13.3	C-IM-IND	52

17.	Support for Multi-tier Networks	59
17.1	General.....	59
17.1.1	SBS subscription types	59
17.1.2	SBS state diagram	59
17.1.3	Closed subscription group identifier (CSGID)	60
17.1.3.1	CSG white list	60
17.1.4	SBS initialization and network exit	60
17.1.4.1	SBS initialization	60
17.1.4.2	SBS network exit	61
17.1.5	Network synchronization	61
17.1.6	Network entry	61
17.1.6.1	MS network entry with SBS	61
17.1.6.2	SBS reselection by the MS	61
17.2	Mobility management	62
17.2.1	Handover (HO)	62
17.2.1.1	Network topology acquisition	62
17.2.1.2	HO decision	63
17.2.2	Idle mode	63
17.3	Interference management.....	63
17.3.1	Resource management	63
17.3.1.1	Fractional Frequency Reuse (FFR).....	64
17.3.1.2	Time-division multiplexed resource scheduling.....	65
17.3.1.3	Trigger conditions.....	66
17.3.2	Multi-BS cooperative transmission	67
17.3.2.1	DL Multi-BS cooperative transmission	67
17.3.2.2	UL Multi-BS MIMO.....	75
17.4	SBS power management	76
17.4.1	General description	76
17.4.2	Duty-cycle mode.....	76
17.4.2.1	Duty-cycle pattern.....	77
17.4.3	Standby mode	78
17.4.3.1	Standby mode initiation	78
17.4.3.2	Standby mode termination	79
17.4.4	Cooperation of base stations for power management.....	79

List of figures

Figure 14-1—SAP service primitive Flow Diagram template	30
Figure 14-49—Primitive flow for duty-cycle mode transition	30
Figure 14-50—Primitive flow for NCMS-initiated standby mode transition.....	31
Figure 14-51—Primitive flow for SBS-initiated standby mode transition	31
Figure 14-52—Primitive flow of C-IM-REQ/RSP	37
Figure 14-53—Primitive flow between IEEE 802.16 entity (BS) and NCMS (IM_RM_Report/IM_CT_Report)	37
Figure 14-54—Primitive flow between IEEE 802.16 entity (BS) and NCMS when C-IM-RSP message is received.....	38
Figure 17-1—Functional overview of SBS states and operational modes	60
Figure 17-2—A logical block example of local STC encoding for Multi-BS CT at BS.....	70
Figure 17-3—Example of frame structure during duty-cycle mode operation.....	76
Figure 17-4—Example of operation in duty-cycle mode	78

List of tables

Table 6-51—MAC management messages	5
Table 6-227am—IM_CT-REQ message format.....	8
Table 6-227an—IM_CT-RSP message format.....	12
Table 6-227ao—IM_CT-CH-REQ message format.....	15
Table 227ap—IM_CT-CH-RSP message format.....	15
Table 10-1—Parameters and constants.....	16
Table 11-1 —Type values for common TLV encodings.....	17
Table 11-15—UCD PHY-specific channel encodings—WirelessMAN-OFDMA	17
Table 11-19—DCD channel encodings.....	18
Table 11-22a—Complementary trigger TLV description	19
Table 11-35—SBC-REQ/RSP management message encodings (OFDMA PHY-specific).....	20
Table 14-1—M-SAP/C-SAP Operation Types.....	28
Table 14-2—M-SAP/C-SAP Event Types	29