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Re:	IEEE 802.16m-08/015r1, Charter and Scope of TGm Rapporteur Groups
Abstract	Report out on the activity of the TGm chartered DL Control Rapporteur Group
Purpose	For discussion in TGm
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Project 802.16m DL Control Structure Rapporteur Group Report

Zexian Li, Roshni Srinivasan, Chulsik Yoon

Project 802.16m DL Control Rapporteur Group Chairs

On March 20, 2008, TGm announced the formation of two Rapporteur Groups, a Downlink Control Rapporteur Group and a Downlink PHY Rapporteur Group. IEEE 802.16m-08/015 and a subsequent revision, IEEE 802.16m-08/015r1, identified the following organization, operation, timeline, and output for the Downlink Control Rapporteur Group as follows:

"The Downlink Control ["DL ctrl"] Rapporteur Group is chartered to develop proposed baseline content regarding the downlink control structure suitable for use in the 802.16m System Description Document (SDD). It shall be submitted by the Rapporteur Group as a Task Group m contribution by 5 May 2008, with the expectation that it could be accepted by Task Group m at Session #55. The Rapporteur Group shall also submit a report of its activities as a TGm contribution by the same deadline. Rapporteur Group Chairs are Zexian Li, Roshni Srinivasan, and Chulsik Yoon. This group should maintain a very close liaison with the Downlink PHY Rapporteur Group to insure a consistent system design."

IEEE 802.16m-08/015r1 further specified:

"All Rapporteur Group discussions will take place on the TGm reflector <http://dot16mreflector.wirelessman.org>, not by teleconference or other means. All message input to the Rapporteur Groups shall be copied to the TGm reflector. Message subjects will begin with the tags "[DL ctrl]" and "[DL PHY]" respectively. Contributions intended for the Rapporteur groups should be uploaded to the appropriate password-protected directories newly established for this purpose: <http://memberupload.wirelessman.org>."

Based on the defined charter, the activities of the DL Control Rapporteur Group were kicked off on 3/25/2008. A work plan was proposed by the Rapporteur Group Chairs in contribution C802.16mDL_ctrl/003 and adopted by the Rapporteur Group. The plan was to develop harmonized SDD text for Project 802.16m downlink control structure based on proposals submitted in Session #54, build consensus and identify proposals that require further harmonization/down selection, and develop a report to capture relevant aspects of the discussions in the Rapporteur Group.

As per the work plan, a list of contributions from Session #54 on DL control structure was uploaded by the Rapporteur Group Chairs on 3/25/2008 as contribution C802.16mDL_ctrl-08/004. The list was subsequently revised based on feedback from members. The following list of contributions in C802.16mDL_ctrl-08/004r1 was compiled as a starting point for development of baseline content for SDD text on the 802.16m DL control structure.

Contribution Number	1st Author
C802.16m-08/122	Fred Vook
C802.16m-08/125r2	Fan Wang
C802.16m-08/134r1	Ming-Hung Tao

C802.16m-08/140	Yih-Shen Chen
C802.16m-08/148	Jeongki Kim
C802.16m-08/149	Youngsoo Yuk
C802.16m-08/150	Heejeong Cho
C802.16m-08/151	Hyungho Park
C802.16m-08/164	Adrian Boariu
C802.16m-08/165r1	Zexian Li
C802.16m-08/170r1	Zhifeng (Jeff) Tao
C802.16m-08/173	Mo-Han Fong
C802.16m-08/176r1	Sophie Vrzic
C802.16m-08/177r1	Robert Novak
C802.16m-08/178r1	Sophie Vrzic
C802.16m-08/181r1	Fan Wang
C802.16m-08/184r2	Mihyun Lee
C802.16m-08/185r1	Hyunkyu Yu
C802.16m-08/186r1	Jaeweon Cho
C802.16m-08/190	Sassan Ahmadi
C802.16m-08/192r1	Gene Marsh
C802.16m-08/207	Sungcheol Chang
C802.16m-08/208r2	Kwanhee Roh
C802.16m-08/210r2	Mingyang Sun
C802.16m-08/211r2	Yunsong Yang
C802.16m-08/212	Juejun Liu
C802.16m-08/217r1	Jia Lin
C802.16m-08/218r2	Hujun Yin
C802.16m-08/219	Seung Joon Lee
C802.16m-08/222r1	Havish Koorapaty
C802.16m-08/223r1	Kiran Thakare
C802.16m-08/224r2	Kang Rui
C802.16m-08/225r2	Sun Changyin

Devlopment of Draft 1: C802.16mDL_ctrl-08/014

In response to the request for contributions for the Table of Contents in Draft 1, the following contributions were submitted by AoE 3/27/08 to the Downlink Control Rapporteur Group.

Contribution	Title, Authors
C801.26mDL_ctrl-08/001	*Proposal for IEEE 802.16m SDD Table of Contents for DL Control Structure*, Mingyang Sun, et al.
C801.26mDL_ctrl-08/002	*Proposal for IEEE 802.16m SDD Table of Contents for DL Control Structure*, Mo-Han Fong, et al.
C801.26mDL_ctrl-08/005	*Proposed ToC for 16m SDD on Downlink Control Channel and Downlink Physical Structure*, Fan Wang, et al.
C801.26mDL_ctrl-08/006	*Proposal for ToC for DL control channel section in 16m SDD*, Xin Qi, et al.
C801.26mDL_ctrl-08/007	*Proposed Table of Contents for IEEE 802.16m SDD on Downlink Control Structure*, Jaeweon Cho, et al.

C801.26mDL_ctrl-08/008	*Proposed ToC for 16m SDD on Downlink Control Structure*, Youngsoo Yuk, et al.
C801.26mDL_ctrl-08/009	*Proposed Table of Contents for IEEE 802.16m SDD on Downlink Control Structure*, Ming-Hung Tao, et al.
C801.26mDL_ctrl-08/010	*Proposed 16m SDD Table of Contents for DL Control Structure*, Sungcheol Chang, et al.
C801.26mDL_ctrl-08/011	*Proposed Table of Contents for IEEE 802.16m SDD on Downlink Control Structure*, Lei Huang, et al.
C801.26mDL_ctrl-08/012	*Proposal for IEEE 802.16m DL Control Channel Structure Table of Contents*, Kang Rui, et al.
C801.26mDL_ctrl-08/013	*Proposed ToC for 16m SDD on Downlink Control Structure, Yih-Shen Chen,* et al.

The 11 proposals for the table of contents that were submitted were consolidated to form the first draft of the Rapporteur Group's contribution to TGm. In order to provide a general framework for SDD text for the DL Control Structure, the table of contents in the draft was organized by function. Reference to specific solutions and related terminology was avoided. Based on the proposals submitted, information that could be included in each section was provided in bracketed text. Dependencies on text in the SDD that is still under development was captured in notes wherever applicable. Draft 1 was submitted by the DL Control Rapporteur Group Chairs as contribution C802.16mDL_ctrl-08/014 on 04/02/2008.

In preparation for the next draft, authors of contributions that were submitted in Session #54 with content on downlink control structure were requested to provide SDD text that would fit in with the structure of Draft 1. While this was not mandatory, authors could ensure that proposed text is adequately represented in the draft. Whenever possible, authors were also encouraged to provide harmonized text with authors of other contributions with a similar philosophy.

Since the ToC in Draft 1 was a consolidation of inputs from all proposals submitted, authors were also requested to include additional sections where proposed text in their contributions could not be included in the framework of Draft 1 for further consideration.

Development of Draft 2: C802.16mDL_ctrl-08/034r2

The following table provides a list of the 18 contributions were uploaded on 4/9/2008 by Rapporteur Group members in response to the call for contributions on SDD text in the framework of Draft 1. These contributions formed the basis for Draft 2.

Contribution	**Title, Authors**
C801.26mDL_ctrl-08/015	*Proposed Text from IEEE C802.16m-08/186r1 for DL Control Structure Sub-section of IEEE 802.16m SDD*, Jaeweon Cho, et al.
C801.26mDL_ctrl-08/016	*Proposed SDD Text on Downlink Control Structure based on C802.16m-08/190*, Hujun Yin, et al.
C801.26mDL_ctrl-08/017r1	*Proposed text and discussion on DL Control Channel Structure based on IEEE C802.16m-08/165r1*, Zexian Li, et al.
C801.26mDL_ctrl-08/018	*Proposed Text from IEEE C802.16m-08/140r1 for DL Control Structure Sub-section of IEEE 802.16m SDD*, Yih-Shen Chen, et al.

C801.26mDL_ctrl-08/019	*Proposed Text from IEEE C802.16m-08/180r1 for DL Control Structure Sub-section of IEEE 802.16m SDD*, Yong Sun, et al.
C801.26mDL_ctrl-08/020	*Proposed Text from IEEE C802.16m-08/185r1 for DL Control Structure of IEEE 802.16m SDD*, Hyunkyu Yu, et al.
C801.26mDL_ctrl-08/021	*Proposed Text from IEEE C802.16m-08/208r2 for DL Control Structure of IEEE 802.16m SDD*, Kwanhee Roh, et al.
C801.26mDL_ctrl-08/022	*Proposed SDD Text on DL Control Structure based on IEEE C802.16m-08/134r1*, Ming-Hung Tao, et al.
C801.26mDL_ctrl-08/023	*Proposed SDD Text on Downlink Control Structure*, Sophie Vrzic, et al.
C801.26mDL_ctrl-08/024	*Proposed Text from IEEE C80216m-08/224r2 for Downlink Control Structure in P802.16m SDD*, Kang Rui, et al.
C801.26mDL_ctrl-08/025	*Proposal on SDD Text on Downlink Control Structure, Fan Wang*, et al.
C801.26mDL_ctrl-08/026	*Proposed Text for SDD Text on Downlink Control Structure*, Mingyang Sun, et al.
C801.26mDL_ctrl-08/027	*Proposed SDD Text of DL Control Structure based on IEEE C80216m-08/225r3*, Sun Changyin, et al.
C801.26mDL_ctrl-08/028	*Proposed Text from IEEE C802.16m-08/184r2 for DL Control Structure of IEEE 802.16m SDD*, Mihyun Lee, et al.
C801.26mDL_ctrl-08/029	*Proposed SDD Text for Downlink Control Structures: Quick Paging Signal*, Havish Koorapaty, et al.
C801.26mDL_ctrl-08/030	*Proposed SDD Text from C80216m-08/207 on DL Control Structure*, Sungcheol Chang, et al.
C801.26mDL_ctrl-08/031	*Proposal on SDD Text on Downlink Control Structure,* Seung Joon Lee, et al.
C801.26mDL_ctrl-08/032r1	*Proposed Text for 16m SDD on Downlink Control Structure*, Youngsoo Yuk, et al.

Contribution C802.16mDL_ctrl-08/033 was uploaded on 04/15/2008. It included text that was merged from all contributions submitted to the Rapporteur Group. Proposed text from the various contributions was included as is. This document was used as a guideline to identify areas of consensus as well as concepts/proposed text that required further harmonization.

Draft 2 uploaded as contribution C802.16mDL_ctrl-08/034 by the Rapporteur Group Chairs on 04/15/2008. This contribution identified consensus in the proposals and listed alternatives that require further harmonization or resolution in every section.

Areas where consensus was observed were identified and corresponding text was included wherever possible. In cases where high level concepts needed to be harmonized first, text from the proposed contributions was not included. Instead, the contribution number was included for reference. In other places where options could be identified clearly, bracketed SDD text for consideration by the group was proposed. Items pending resolution were identified in each section.

As with Draft 1, reference to specific solutions and related terminology, detailed procedural text and information were avoided. Dependencies on text in the SDD that is still under development were captured in notes wherever applicable.

Since Draft 2 included initial text and could be developed further to provide more comprehensive SDD text, members were strongly encouraged to use the Google group to build consensus on bracketed

text and harmonize alternatives. They were also requested to keep consistency between the different sections of the document in mind when harmonizing text so that conflicts between sections were not introduced. Supporting contributions to provide additional details or the rationale for proposed concepts or text were also solicited to facilitate the consensus building process.

Harmonized text in support of options identified for each item provided input to Draft 3. Members were requested to provide such input by AoE Wednesday, 4/23/2008.

Discussions in the Rapporteur Group following the release of Draft 2 included the addition of options that were not captured in the draft. Emails related to the multiplexing data and control, superframe header content and location of control assignment blocks provided clarifications on the included text for more complete descriptions of the proposed options.

Draft 2 was updated during the discussions to reflect the options and text that had been omitted. C802.16mDL_ctrl-08/034r1 was uploaded on 04/17/08 and C802.16mDL_ctrl-08/034r2 was uploaded on 04/23/08.

As suggested by the members, a spreadsheet, C802.16mDL_ctrl-08_035.xls, with a summary of issues that need further discussion as identified in Draft 2 was uploaded by the Rapporteur Group Chairs.

Members' input to this spreadsheet was solicited to facilitate the harmonization process in preparation for the next draft. In order to develop a better understanding of the concepts common to proposals and the differences between them, details were broken down into key concepts. Concise text that captured contributors' ideas without reference to terms that are too specific to their proposals was solicited. Suggestions for modifications and/or additional entries and supporting contributions with details of submitted proposals for harmonization were also requested.

Details on the synchronization channel, multicast service control channels and multicarrier support were omitted from the spreadsheet. Entries related to these items were considered optional since such text would depend on contributions that will be submitted in Session #55 or later.

Development of Draft 3: C802.16mDL_ctrl-08/037

The following contributions to the Downlink Control Rapporteur Group that were submitted by AoE 4/23/2008 were then consolidated by the Rapporteur Group Chairs in Draft 3:

Contribution	**Title, Authors**
C801.26mDL_ctrl-08/035r1	*Discussion Items in Draft 2 of RG Contribution on SDD Text for DL Control (consolidated spreadsheet)*
C801.26mDL_ctrl-08/038.doc	*Proposal for Draft 3 SDD Text on DL Control Structure*, Sungcheol Chang, et al.
C801.26mDL_ctrl-08/039.doc	*Proposed Text for SDD Text on Downlink Control Structure*, Mingyang Sun et al.
C801.26mDL_ctrl-08/040.doc	*Proposal for DL Control Information Classification*, Shailender Timiri et al.
C801.26mDL_ctrl-08/041.doc	*Proposed Harmonized SDD text on Downlink Control Structure*, Youngsoo Yuk, et al.

C801.26mDL_ctrl-08/042.doc	*Proposed Harmonized SDD text on Downlink Control Structure*, Youngsoo Yuk, et al.
C801.26mDL_ctrl-08/043.doc	*Proposed Harmonized SDD text on Downlink Control Structure*, Youngsoo Yuk, et al.
C801.26mDL_ctrl-08/044.doc	*Proposed Text Modification to DL Control Rapporteur Group Draft 3 Contribution*, Yih-Shen Chen, et al.
C801.26mDL_ctrl-08/045.doc	*Proposed Text for 802.16m DL Unicast Service Control Channel*, Zexian Li, et al.
C801.26mDL_ctrl-08/046.doc	*Proposal for DL Control SDD Text for Draft 2 of DL Control Rapporteur Group Contribution*, Mo-Han Fong et al.
C801.26mDL_ctrl-08/047.doc	*Proposal for DL Control Structure of SDD text for DL Control Rapporteur Group Contribution*, Mihyun Lee, et al.
C801.26mDL_ctrl-08/048.doc	*Harmonized Text for DL Control Structure of IEEE 802.16m SDD (sub-clause 11.x.3, 11.x.4)*, Hyunkyu Lee, et al.
C801.26mDL_ctrl-08/049.doc	*Proposal for DL Control SDD Text for Draft 2 of DL Control Rapporteur Group Contribution*, Kang Rui, et al.
C801.26mDL_ctrl-08/050.doc	*Draft 2 of DL Control Rapporteur Group Contribution: SDD Text on Downlink Control Structure*, Ming-Hung Tao, et al.

The Rapporteur Group Chairs uploaded 3 contributions for review by members on 04/28/2008. Draft 3 was uploaded at <http://memberupload.wirelessman.org> as Contribution C802.16mDL_ctrl-08/037. This document was an update to Draft 2 (C802.16mDL_ctrl-08/34r2) based on RG contributions submitted in preparation for Draft 3. The spreadsheet C802.16mDL_ctrl-08/035r1 and MS Word document, C802.16mDL_ctrl-08/036 were also uploaded as a reference for merged text and proposed options.

Based on the input received, options that could be considered for inclusion in SDD text for different aspects of the DL control structures were included in the draft. As with Draft 3, areas where consensus was observed and items pending resolution in each section were also identified. Members were requested to inform the Rapporteur Group Chairs if relevant aspects of proposals submitted in were not captured in the draft.

Development of final draft: IEEE C802.16m-08/297

For the final phase of discussion, the Rapporteur Group Chairs requested members to outline criteria and comparisons that would highlight the advantages/disadvantages for various options that have been proposed. Members were also encouraged to continue discussion on Draft 3 until AoE, Thursday, 5/1/2008.

Several emails were exchanged during this time between members in the group and the Rapporteur Group Chairs. Several members found the inclusion of the superframe header as part of the content on the broadcast channel to be redundant. As a result of the discussions, the Rapporteur Group Chairs reorganized the content in the section on the Broadcast Channel to incorporate the modifications suggested by members.

Informative text on the transmission format for Unicast Service Control Channels was added to clarify the options that were specified. Text on support for legacy operation was also included. The mapping of information to control channels was updated based on suggested changes to the classification of essential system configuration information.

Options were added and proposed text was revised to capture proposed concepts more accurately. All feedback from email discussions in the Rapporteur Group was incorporated in the final contribution. Editors' notes on observed consensus and items requiring resolution are included in the final draft IEEE C802.16m-08/297 instead of this report to provide the necessary details related to the listed options.

Editorial comments on the proposed text in Draft 3 were solicited by AoE Thursday 5/1/2008. No editorial comments were received.

The final contribution with proposed baseline content on the Downlink Control Structure for the 802.16m SDD, was submitted to TGm on Monday, 5/5/2008. Once the options in this document are further harmonized and resolved by TGm in Session #55, baseline content that has been proposed may be expanded further to describe the 802.16m DL control structure in more detail.

A call for comments on IEEE C802.16m-08/297 with a deadline of noon, Macau time, May 12, 2008 has been issued as the next step in the development of SDD text on the 802.16m Control Structure. Members are invited to submit comments and supporting text to build on the baseline content drafted by the DL Control Rapporteur Group.

Comment Resolution in Session #55

A total of 104 comments on the IEEE C802.16m-08/297 were recorded in the commentary database C802.16m-08/514. 16 supporting contributions were submitted. Comments were resolved in a breakout session on Tuesday 5/12/08 and Wednesday 5/13/08 by rapporteur group participants.

Comments on information classification were harmonized by participating members and the harmonized text was adopted unanimously by the group.

There were extensive discussions on issues related to the broadcast channel (BCH). The group voted to classify the BCH into Primary and Secondary Broadcast Channels (PBCH and SBCH). Two criteria for separation of the BCH into PBCH and SBCH were proposed. Since the criteria were not mutually exclusive, harmonized text that merged the criteria was proposed. It was also decided that the BCH is located in superframe header. The ambiguity around the transmission of additional broadcast information led to reorganization of the ToC. Information classification was followed by a description of the transmission of the information.

It was agreed that the SCH was TDM with the BCH. Additionally, it was also agreed that other data channels in the same subframe were FDM with the BCH in the SFH. Since no other control channels are currently defined in the SFH, the issue of multiplexing the BCH with other control channels in the

SFH was deferred. Multiple antenna schemes for transmission of the BCH were supported without specification of the scheme or the associated signaling.

Contributions related to Unicast Service Control were presented and discussed in detail in the evening session on Tuesday. The contributions presented arguments in favor of specific choices of the multiplexing between data and unicast service control and the transmission format.

Comments on each section of the Unicast Service Control channels were discussed in groups and a common resolutions for the groups of comments were developed to address the various issues addressed. Proposed text for information content was well harmonized. However, it was recognized that there sufficient data or analysis was not available to enable the down selection of the multiplexing scheme for data and unicast service control channels or the transmission format. Some members of the group agreed to use the email reflector to harmonize an evaluation methodology and metrics for comparison. Yi Hsuan from Intel volunteered to lead this effort over the next three weeks to allow sufficient time for development of simulation results and further analysis for the comparison.

Due to insufficient time, discussions on structures for multicast service control were deferred.

The Rapporteur Group Chairs greatly appreciate the time and effort taken by participants to contribute to the development of text within the tight timelines of the work plan.