Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>	
Title	PAR and Five Criteria for 802.16 Mobile Multihop Relay	
Date Submitted	2005-11-11	
Source(s)	Mitsuo Nohara KDDI Corporation 10-10, Iidabashi 3-chome, Chiyoda-ku, Tokyo 102-8460, Japan	Voice: +81-3-6678-3599 Fax: +81-3-6678-0279 mailto: mi-nohara@kddi.com
	Jaeweon Cho Samsung Electronics Co., Ltd. 416 Maetan-3, Suwon, 442-600, Korea	Voice: +82-31-279-5796 Fax: +82-31-279-5130 mailto: jaeweon.cho@samsung.com
Re:		
Abstract		
Purpose	For 802.16 MMR SG Approval	
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve (s) the right to add, amend or withdraw material contained herein.	
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.	
Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.	

IEEE-SA STANDARDS BOARD

PROJECT AUTHORIZATION REQUEST (PAR) FORM - 2005

The submittal deadlines are available at **http://standards.ieee.org/board/nes/index.html**.
(See NesCom Convention - Item #14)

Prior to submitting your PAR, please review the **NesCom Conventions**.

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1. ASSIGNED PROJECT NUMBER P [802.16j] (Please leave blank if not available.)
(See NesCom Convention - Item #19)

2. SPONSOR DATE OF REQUEST Day: [] Month: [3] Year: [2006]

3. TYPE OF DOCUMENT(Please check one.)

- ☐ **Standard for** {document stressing the verb "shall"}
- ☐ **Recommended Practice for** {document stressing the verb "should"}
- ☐ **Guide for** {document in which good practices are suggested, stressing the verb "may"}

4. TITLE OF DOCUMENT
(See NesCom Conventions - Item #5, Item #7)
Draft [Amendment to IEEE Standard for Local and Metropolitan Area Networks – Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems – Amendment for Physical and Medium Access Control Layers for Mobile Multihop Relay]

5. LIFE CYCLE

- ☐ **Full-Use**
- ☐ **Trial-Use**

6. **TYPE OF PROJECT**

- ☐ New document
- ☐ Revision of an existing document (indicate number and year existing document was approved in box to the right):
- ☐ Amendment to an existing document (indicate number and year existing document was approved in box to the right): [IEEE 802.16-2005] (####-YYYY)
- ☐ Corrigendum to an existing document (indicate number and year existing document was approved in box to the right):
- ☒ Modified PAR (indicate PAR Number and Approval Date here: P [] Day: [] Month: [] Year: [])

Is this project in ballot now? ☐ Yes ☐ No
State reason for modifying the PAR in Item #21.

7. WORKING GROUP INFORMATION:
2

Name of Working Group (WG) : [IEEE 802.16 Working Group on Broadband Wireless Access]
Approximate Number of Expected Working Group Members: [200]

8. CONTACT INFORMATION FOR **WORKING GROUP CHAIR** (must be an IEEE-SA member as well as an IEEE and/or Affiliate Member)
(See NesCom Convention Item #3, Item #4)
Name of Working Group Chair: First Name: [Roger] Last Name: [Marks]
Telephone: [+1 303 497 3037] FAX: [] E-mail: [r.b.marks@ieee.org]

9. CONTACT INFORMATION FOR **CO-CHAIR/OFFICIAL REPORTER**, Project Editor or Document Custodian if different from the Working Group Chair (must be an IEEE-SA member as well as an IEEE and/or Affiliate Member)
(See NesCom Convention Item #3)

Name of Co-Chair/Official Reporter (if different than Working Group Chair): First Name: [] Last Name: []
Telephone: [] FAX: [] E-mail: []

10. CONTACT INFORMATION FOR **SPONSORING SOCIETY OR STANDARDS COORDINATING COMMITTEE**
(See NesCom Convention Item #1, Item #3)
Sponsoring Society and Committee: [C/LM] (Please choose the correct acronym for your Sponsor Society/Technical Committee or SCC. For an acronym list, please click here.)
Sponsor Committee Chair: First Name: [Paul] Last Name: [Nikolich]
Telephone: [+! 857 205 0050] FAX: [] E-mail: [p.nikolich@ieee.org]
Standards Coordinator (Power Engineering Society Only):
Standards Coordinator: First Name: [] Last Name: []
Telephone: [] FAX: [] E-mail: []
IF THIS PROJECT IS BEING SPONSORED BY TWO SPONSORS, PLEASE COMPLETE THE INFORMATION BELOW
Sponsoring Society and Committee: [MTT] (Please choose the correct acronym for your Sponsor Society/Technical Committee or SCC. For an acronym list, please click here.)
Sponsor Committee Chair: First Name: [Jeffrey] Last Name: [Jargon]
Telephone: [+1 303 497 3596] FAX: [] E-mail: [jargon@boulder.nist.gov]
Standards Coordinator (Power Engineering Society Only):
Standards Coordinator: First Name: [] Last Name: []
Telephone: [] FAX: [] E-mail: []

11. **SPONSOR BALLOTING INFORMATION** (Please choose one of the following):

- Individual Balloting
- Entity Balloting
- Mixed Balloting (combination of Individual and Entity Balloting)

Expected Date of Submission for Initial Sponsor Ballot: Month: [3] Year: [2007]

Please review the PAR form three months prior to submitting your draft for ballot to ensure that the title, scope, and purpose on the PAR form match the title, scope, and purpose of the draft. If they do not match, you will probably need to submit a modified PAR.

Additional communication and input from other organizations or other IEEE Standards Sponsors should be encouraged through participation in the working group or the invitation pool.

(See NesCom Conventions - Item #20)

12. **PROJECTED COMPLETION DATE FOR SUBMITTAL TO REVCOM**: Month: [9] Year: [2007]
If this is a MODIFIED PAR and the completion date is being extended past the original four-year life of the PAR, please answer the following questions. **If this is not a modified PAR, please go to Question #13.**
(See NesCom Conventions - Item #18)
a. Statement of why the extension is required: []
b. How many working group members are working on the project? []
c. How many times a year does the working group meet: []
1. In person? []
2. Via teleconference? []
d. How many times a year is a draft version circulated to the working group via electronic means? []
e. What percentage of the Draft is stable? []%
f. How many significant working revisions has the Draft been through? []
g. Balloting History - If the draft has gone to ballot, please provide a history of all IEEE Sponsor ballots under this project in the box to the right. Please include the: []

- Ballot Close Date (or scheduled Close Date)
- Ballot Draft Number
- Ballot Results (% affirmative, % negative, % abstain)

h. Is this the first request for an extension? ? Yes ? No
If no, when was the previous extension approved? [] (DD-MMM-YYYY)

13. **SCOPE OF PROPOSED PROJECT**
(See NesCom Conventions - Item #6, Item #16, Item #17)

Briefly detail the projected output including technical boundaries.
FOR MODIFIED PROJECTS/REVISION DOCUMENTS - Only detail the projected output including the scope of the project or last published document to be modified and any amendments and/or additions.

[This document provides enhancements to IEEE Std. 802.16-2005 by employing mobile multi-hop relay techniques between base station and mobile station, and thereby specifies a system and functions on PHY and MAC layers to support the multi-hop relay.]

Is the completion of this document contingent upon the completion of another document?

? Yes (with detailed explanation below) ? No

14. **PURPOSE OF PROPOSED PROJECT**
Briefly, clearly and concisely explain "why" the document is being created.
(See NesCom Conventions - Item #16)

FOR MODIFIED PROJECTS/REVISION DOCUMENTS - Only include the purpose of the project or last published document and any amendments and/or additions.
[This amendment provides specifications of the multi-hop relay function enhancing coverage, capacity and flexibility, while being compatible with IEEE Std. 802.16-2005]

15. **REASON FOR THE PROPOSED PROJECT:**
Give the specific reason for the standardization project. Focus on explaining the problem being addressed, the benefit to be provided and the stakeholders for the project.
[The multi-hop relay is a promising solution to expand coverage, enhance capacity, and provide flexibility to IEEE 802.16 systems. In addition, it enables a rapid deployment and also reduces the cost of deploying and operating the systems. Those will expand the market opportunity for Broadband Wireless Access.]

16. INTELLECTUAL PROPERTY (Please answer each of the questions below)

a. Has the **IEEE-SA policy on intellectual property** been presented to those responsible for preparing/submitting this PAR prior to the PAR submittal to the IEEE-SA Standards Board? ? Yes ? No

If yes, state date: Day: [] Month: [] Year: []
If no, please explain: []

b. Is the Sponsor aware of **copyright** permissions needed for this project? ? Yes ? No

If yes, please explain: []

c. Is the Sponsor aware of **trademarks** that apply to this project? ? Yes ? No

If yes, please explain: []

d. Is the Sponsor aware of possible **registration activity** related to this project? ? Yes ? No

If yes, please explain:

17. ARE THERE OTHER DOCUMENTS OR PROJECTS WITH A **SIMILAR SCOPE**?
? Yes (with detailed explanation below) ? No
[IEEE802.16-2004(Mesh mode), IEEE802.11TGs]

If Yes, please answer the following:
Sponsor Organization: []
Project/Document Number: []
Project/Document Date: [] (DD-MMM-YYYY)
Project/Document Title: []

18. **FUTURE ADOPTIONS**
Is there potential for this document (in part or in whole) to be adopted by another national, regional or international organization? [Yes]
If Yes, the following questions must be answered:
Technical Committee Name and Number: [ITU] TC[] SC[] WG[]
Other Organization Contact Information:
Contact Name - First Name: [Jose] Contact Name - Last Name: [Costa]
Contact Telephone Number: [+1 613 763 7574]
Contact FAX Number: [+1 613 765 1225]
Contact Email address: [j.costa@ieee.org]

19. WILL THIS PROJECT RESULT IN ANY **HEALTH, SAFETY, OR ENVIRONMENTAL GUIDANCE** THAT AFFECTS OR APPLIES TO HUMAN HEALTH OR SAFETY? ? Yes ? No

If yes, please explain: []

20. **SPONSOR INFORMATION**

a. Is the scope of this project within the approved scope/definition of the Sponsor's Charter? Yes No

If no, please explain: []

b. Have the Sponsor's procedures been accepted by the IEEE-SA Standards Board Audit Committee?
Yes No
(See NesCom Convention Item #2)

21. **ADDITIONAL EXPLANATORY NOTES** (Item Number and Explanation)
[]
I acknowledge having read and understood the IEEE Code of Ethics. I agree to conduct myself in a manner which adheres to the IEEE Code of Ethics when engaged in official IEEE business.

The **PAR Copyright Release and Signature Page** must be submitted by FAX to +1 732-875-0695 to the NesCom Administrator before this PAR will be forwarded to NesCom and the Standards Board for approval.

(See NesCom Conventions - Item #8, Item #9, Item #10)

Five Criteria for IEEE 802.16 Mobile Multi-hop Relay PAR

IEEE P802.16mmr Five Criteria, Draft 0
CRITERIA FOR STANDARDS DEVELOPMENT (FIVE CRITERIA)

Broad Market Potential
A standards project authorized by IEEE 802 shall have a broad market potential. Specifically, it shall have the potential for:
a) Broad sets of applicability.
b) Multiple vendors and numerous users.
c) Balanced costs (LAN versus attached stations).

MMR-SG Objectives:
Please regard following remarks as objectives to prepare for the comments to each objective.
(a) Broad sets of applicability
To indicate the wide applicability of MMR from fixed, nomadic and mobile service viewpoints. This can be achieved by indicating the merits of relay - coverage extension and throughput enhancement.
The coverage extension with relay function can make the system deployment easy and at low cost.
This can accelerate the IEEE802.16-2005 and P802.16e service introduction covering the wide area with the relay stations.
Also it enables higher bit-rate access from users in outskirts of service cell, that is, higher-grade service can be provided.

(b) Multiple vendors and numerous users
To indicate the continuing project support (by us) since we got from various sectors of vendors and operators as a majority of the WG when we decided by vote to form the SG at the last July meeting.

(c) Balanced costs (LAN versus attached stations)
To indicate that the relay station can be far cheaper compared with the full BS installation. This is effective especially when we introduce the service at wide coverage quickly. We may further replace it with the BS along with the service growth in an evolution manner.

reply baseline (examples):
a) IEEE802.16 wireless standard, will take place of xDSL, Cable, T1 level services and fiber optic broadband technologies. Also the one with mobility support will provide wireless access at a higher rate compared with conventional cellular services. The throughput enhancement and coverage extension through relay stations will expand such market potential.

b) IEEE802.16's high transmission speed and wide coverage for Wireless MAN, attract many commerce leaders. The approval of MMR (Mobile Multi-hop Relay)-SG by 77 members including various manufacturers and telecom operators, signifies the possibility of multiple vendors.
When we provide a higher transmission rate access to a user, the service coverage can be reduced in reverse proportion. The relay capabilities will be able to overcome this issue, and increase the possible number of users.

c) The relay stations with the PMP (Point-to-Multipoint) mode can provide wireless packet forwarding functions with simpler and more compact station configuration, thus at low cost. Thus, MMR system is cost effective to accommodate many mobile subscriber stations and establish the wide area and the higher data rate.

Compatibility
IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management and Interworking documents as follows: 802.Overview and Architecture, 802.1D,

802.1Q and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802.
Each standard in the IEEE 802 family of standards shall include a definition of managed objects which are compatible with systems management standards.

reply baseline (examples):
The proposed standards will conform to IEEE Standard 802.16-2005 and P802.16e (P-MP mode), excluding the MMR extension.

Distinct Identity
Each IEEE 802 standard shall have a distinct identity. To achieve this, each authorized project shall be:
a) Substantially different from other IEEE 802 standards.
b) One unique solution per problem (not two solutions to a problem).
c) Easy for the document reader to select the relevant specification.

reply baseline (examples):
a) The current standards aim to provide a single hop connectivity for user terminals. The modification to the existing standards for the purpose for MMR includes:
Coverage extension from a BS;
Throughput enhancement in specific areas;
MAC for MMR support;
Route selection via relay stations.
It should be noted that this project is targeted to extend the current standards without changing the operational frequency band, i.e. the co-frequency scheme with the current single-hop connections.

b) By modifying the existing IEEE Standard 802.16-2005 and P802.16e (P-MP mode), a unique solution will be developed. The MMR extension to the standard will provide wider coverage areas and higher throughput without increasing the transmission power of user terminals.

c) It is anticipated that the document will be easily selectable by the user.

Technical Feasibility
For a project to be authorized, it shall be able to show its technical feasibility. At a minimum, the proposed project shall show:
a) Demonstrated system feasibility.
b) Proven technology, reasonable testing.
c) Confidence in reliability

reply baseline (examples):
a) Some wireless systems such as IEEE 802.11 TGs and mesh FWA (Fixed Wireless Access) are already studied and developed. Relaying data between wireless stations is one of the most popular solutions to extend a wireless coverage area.

b) The MMR protocol is an extension of P-MP mode in both IEEE Standard 802.16-2005 and P802.16e.

c) Most of the technology of the new protocols leverages the technology of IEEE Standard 802.16-2005 and P802.16e. Furthermore, some FWA systems use such technology to establish wireless backhaul network.

Economic Feasibility
For a project to be authorized, it shall be able to show economic feasibility (so far as can reasonably be estimated), for its intended applications. At a minimum, the proposed project shall show:
a) Known cost factors, reliable data.
b) Reasonable cost for performance.

c) Consideration of installation costs.

MMR-SG Objectives:
Please regard following remarks as objectives to prepare for the comments to each objective.
Known cost factors, reliable data
Reasonable cost for performance
Consideration of installation costs

To indicate that the relay station can be far cheaper compared with the full BS installation as discussed in "Technical Feasibility."

reply baseline (examples):
a) Relay technology enable to extend a service area at low cost since it does not need at least communication cabling cost for the RS since it can be provided in wireless manner.

b) The new protocol is based thus can highly depend on and P-MP mode in both IEEE Standard 802.16-2005 and P802.16e, which is to be widely developed. Additionally, the new technology will minimize the installation cost to extend a service area than setting of a new BS (Base Station).

c) To install the relay function discussed in MMR SG, a few requires are needed and most of the technology of the new protocol can leverages the technology of IEEE 802.16 standard.
* This sentence may be deleted as it looks duplicated with the first part of comment (b) above.