Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Neighbor Path Metric in Neighbor Information**
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`Source(s)	Shyamal Ramachandran Motorola, Inc. 1064 Greenwood Blvd. Ste. 400 Lake Mary, FL 32746 USA Voice: (407) 562 4054 Fax: (407) 562 4001 shyamal.ramachandran@motorola.com
Re:	IEEE 802.16j technical contribution in response to call IEEE 802.16j-07/007r2.
Abstract	This contribution proposes a method to deliver to RSs the path metric between its neighbor RSs and the MR-BS.
Purpose	Discussion and adoption of the proposed text changes in IEEE 802.16j.
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Neighbor Path Metric in Neighbor Information

Shyamal Ramachandran

Problem Statement

The path selected by the RS to reach the MR-BS might have been the best available at the time of network entry. However, due to constantly changing physical link characteristics and network traffic load, the current path to the MR-BS might no longer be the best. It is possible that a path through a different access station might prove to be a better choice. Therefore, it is essential that each RS be continuously aware of its neighbors and path options to the MR-BS through them.

This proposal enables a RS in a MR cell to determine the end-to-end (ETE) path cost of reaching the MR-BS through its neighbors.

Consider the exemplary MR network shown in Figure 1. BS is a MR-BS. RS1, RS2 and RS3 are relay stations that have entered the MR cell directly through BS. C_{b1} is the path cost of the path between BS and RS1. C_{b2} is the cost of the path between BS and RS2. C_{b3} is the cost of the path between BS and RS3.

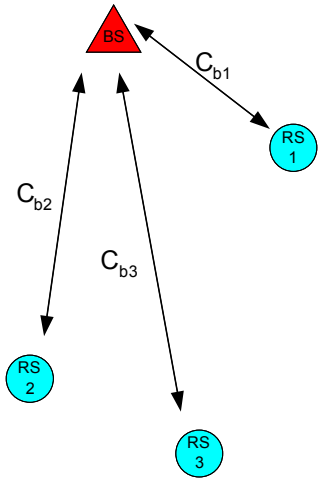

Figure 1 - Exemplary IEEE 802.16j network with relay stations

In the example shown in Figure 1, if RS3 wants to reach the BS through any other RS, it needs to learn of the presence of RS1 and RS2. Further, it needs to determine the ETE path metric to BS through RS1 and RS2. For this purpose RS3 must measure the quality of the air interface link between itself and the other two relay stations. Further, RS3 must also determine the existing path metric from the BS to RS2 and RS1, i.e. the path metric values Cb2 and Cb1.

RS3 can detect the presence of neighboring RSs and may perform the 1-hop air interface measurements to RS1 and RS2 using postamble or other signature sequence transmissions being proposed by other contributions. This is out of the scope of this contribution. However, in order to decide whether the path to the BS through RS1 is better or worse than the path through RS2; or to decide if either path options through RS1 or RS2 is better than its current direct path, RS3 must learn the current path metrics Cb1 and Cb2. This contribution proposes a method to enable RS3 learn these path metric values.

Proposed Solution

The current IEEE 802.16j working document (802.16j-06/026r2) has already adopted a message MR_NBR-INFO, which permits the MR-BS to inform each RS of the other neighbors in its neighborhood. This message also includes the preamble index being transmitted by these neighbors. In the context of the example shown in Figure 1, BS sends a MR_NBR-INFO message to RS3 including RS1 and RS2 as neighbors.

The MR_NBR-INFO message has the option of carrying TLV encoded values as shown in section 11.XX.

It is proposed that the ETE path cost from the neighbor to the MR-BS be included as a TLV parameter.

This enables RS3 to learn of Cb1 and Cb2 via the MR_NBR-INFO message sent by BS.

Proposed Text

Insert new row to table in subclause 11.XX:

11.XX MR_NBR-INFO Management Message Encoding

Name	Type (1 byte)	Length (bits)
DCD Configuration Change count	1	4
UCD Configuration Change count	2	4
DCD settings	3	Variable
UCD settings	4	Variable
Neighbor BS trigger	5	Variable
PHY Mode ID	6	8
ETE Metric	**7**	**16**