Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>	
Title	Routing Announcements for Network Entry Support	
Date Submitted	01/08/2007	
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Re:	Call for Technical Proposals regarding IEEE Project P802.16j (IEEE 802.16j-06/034)	
Abstract	IE that needs to be added to enable improved network entry support for relay stations.	
Purpose	Adoption of the proposed text into P802.16j	
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Routing Announcements for Network Entry Support

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1 Introduction

This contribution proposes a method of transmitting routing related parameters in order to facilitate the network entry of Relay Stations (RSs) in a multihop relay (MR) network.

In order to facilitate the incorporation of this proposal in to IEEE 802.16j standard, specific changes to the baseline working document IEEE 802.16j-06/026 are listed in Section 3.

2 General Description

In a multihop IEEE 802.16 network that employs relay stations (RS) for the purpose of coverage extension or capacity improvement, it is important for the RSs entering the network, to consider the routing characteristics of the access station and the path from the access station to its MR-BS, before associating with the access station.

2.1 Elements of Routing Announcements

There are several parameters that are of interest and should be considered.

2.1.1 Path Metric to the MR-BS

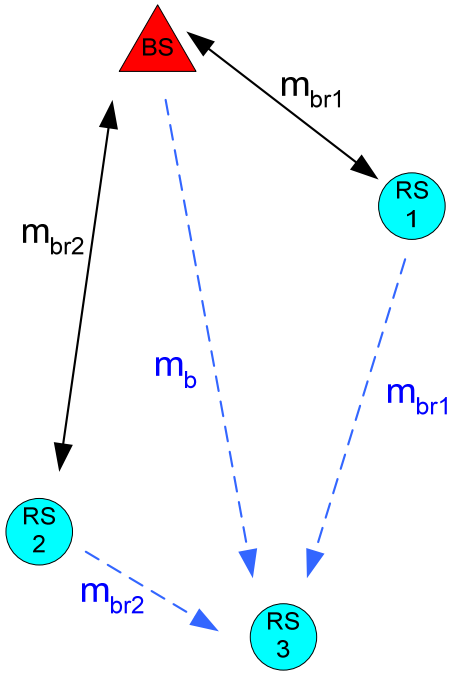

Figure 1 – Path metric announcement

Consider the exemplary network shown in Figure 1. BS is a MR-BS. RS1 and RS2 are already in the network and are associated to BS as per the topology shown. The end-to-end (ETE) path metric between RS1 and BS is m_{br1} and between RS2 and BS is m_{br2}.

When RS3 enters the MR network, it should be made aware of the ETE path metric from each access station to BS, so that RS3 may include this information in its network entry decisions. Each MR-BS and RS should transmit this information on the downlink using the mechanism described in Section 2.2. The MR-BS should also transmit a metric value (m_b, in this example).

2.1.2 Number of Hops to the BS

Each RS should transmit on the downlink, its number of hops to the MR-BS that they are associated to. The mechanism used to transmit this information is described in Section 2.2.

2.1.3 BSID

Each RS should transmit on the downlink, the BSID of the MR-BS it is associated to. The mechanism used to transmit this information is described in Section 2.2.

2.1.4 Next Hop towards the BS

Each RS should transmit on the downlink, the node ID of the device that is their next hop towards the MR-BS. The mechanism used to transmit this information is described in Section 2.2.

2.2 Data Encapsulation

The above information may be encapsulated in to a structure (Routing_Advertisement_IE), and may be carried in the DL-MAP transmitted by the MR-BS and the RSs, as an extended IE.

Additionally, the above information may be encapsulated as TLVs to be carried in the DCD message.

2.3 Modified Network Entry Procedure

Figure 55a has been modified and shown below to depict the changes anticipated to the network entry procedure as a result of the incorporation of path selection.

3 Proposed Text Changes

6.3.2.3.1 Downlink Channel Descriptor (DCD) message

Insert the following text at the end of the 6.3.2.3.1:

The following parameters, which are coded as TLV tuples as defined in 11.4, shall be included in the DCD message.

Number of hops
The number of hops to RS which transmits the DCD from BS.

ETE Metric
The ETE metric of the path between the RS transmitting the DCD and the BS it is associated to.

Metric Type
The type of ETE metric being used.

BSID
The ID of the BS that the RS is associated to.

Next Hop Node ID
The ID of the next hop station towards the BS.

The RS entering the MR network shall decode the DCD and use its contents to select the access station to enter the MR network through it. The RS shall then proceed to complete the rest of the network entry procedure with the selected access station.

6.3.9 Network entry and initialization

Insert the following text at the end of the 6.3.9:

The RS initial network entry procedure can be divided into the following phases:

a) Scan for downlink channel and obtain path selection parameters
b) Obtain transmit parameters (from UCD message)
c) Decide a desired path and establish synchronization with the superordinate node (BS or RS)
d) Perform ranging
e) Negotiate basic capabilities
f) Authorization RS and perform key exchange
g) Perform registration
h) Set up connections

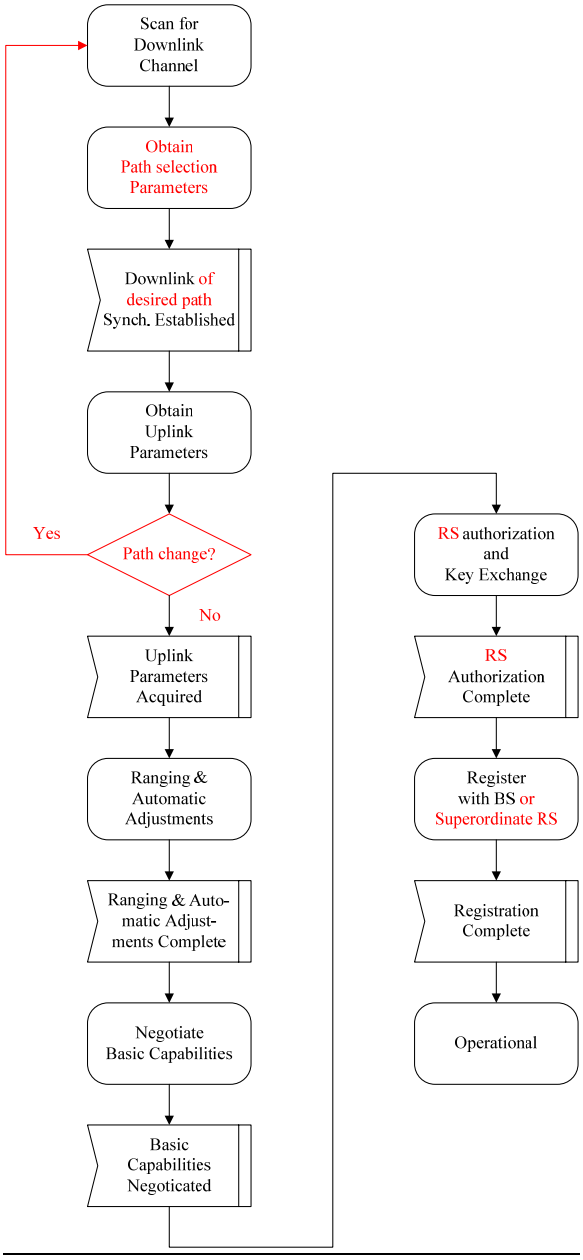

Figure 55a – RS Initialization overview

[Insert text in sub clause 6.3.9.16]

[Insert a new sub clause 6.3.9.16.1]

6.3.9.16.1 Network Entry Procedure for RS

This section describes the network entry procedure for relay stations entering an MR network.

[Insert a new sub clause 6.3.9.16.1.1]

6.3.9.16.1.1 Routing Announcements for network Entry Support

The MR-BS and the RS shall transmit the Routing_Advertisement_IE in the form of a DL-MAP extended IE in the DL-MAP message transmitted in the MMR-BS-to-MS and RS-to-MS control zones. [These zones are defined in C80216j-06_155].

Routing_Advertisement_IE is defined in section 8.4.5.3.28.

The RS entering the MR network shall decode the Routing_Advertisement_IE and use its contents to select the access station to enter the MR network through it. The RS shall then proceed to complete the rest of the network entry procedure with the selected access station.

[Change section 8.4.5.3.2.1]

[Insert new row in Table 277a]

Extended DIUC (hexadecimal)	**Usage**
0A	**Routing_Advertisement _IE**

[Insert a new sub clause 8.4.5.3.28]

8.4.5.3.28 Routing Advertisement IE

[Insert the following text in section 8.4.5.3.28]

In the DL-MAP the MR-BS and the RS may transmit DIUC = 15 with the Routing_Advertisement _IE() to facilitate RS network entering.

Syntax	**Size**	**Notes**
Routing_Advertisement_IE(){	-	-
Extended DIUC	4 bits	RANN = 0x0A
Length	4 bits	Length = 0x06 or 0x13
ETE Metric	variable	The metric of the path from the access station to its MR-BS
Metric Identifier	32 bits	Identifies the ETE metric being used. Most significant 3 octets represent the OUI. Least significant 1 octet represents specific metric. See table (below) for metric identifier encoding.
BSID	48 bits	The BSID of the MR-BS to which the access station is associated
Next Hop Node ID	48 bits	The ID of the node next hop towards the MR-BS.
Number of Hops	8 bits	Number of hops from the access station to its MR-BS
}	-	-

The “Length” field of the Routing_Advertisement_IE() could take either of the two values, 0x06 and 0x13. This enables MR-BSs to transmit a shorter version of the Routing_Advertisement_IE().

The following table lists values for the Metric Identifier field and the method to generate vendor specific metric identifiers.

Metric Identifier		**Value**
OUI	**Metric #**	
00-0F-AC	01	TBD (Simple Standardized Metric)
Vendor OUI	Vendor Metric #	Vendor Specific Metric

11.4 DCD management message encodings

Insert the following entries into Table 385:

Table 385 – DCD channel encoding (continued)

Name	Type (1 byte)	Length	Value
Number of hops	61	2	Number of hops from the access station to its MR-BS
ETE Metric	62	2	ETE metric value
Metric Type	63	4	Identifies the ETE metric being used. Most significant 3 octets represent the OUI. Least significant 1 octet represents specific metric. See table (below) for metric identifier encoding.
BSID	64	6	The BSID of the MR-BS to which the access station is associated
Next Hop Node ID	65	6	The ID of the node next hop towards the MR-BS.

The following table lists values for the Metric Identifier field and the method to generate vendor specific metric identifiers.

Metric Identifier		**Value**
OUI	**Metric #**	
00-0F-AC	01	TBD (Simple Standardized Metric)
Vendor OUI	Vendor Metric #	Vendor Specific Metric