Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Service Flow Based Dedicated Resource Update
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Re:	A response to a Call for Technical Comments and Contributions regarding IEEE Project 802.16j, http://wirelessman.org/relay/docs/80216j-07_013.pdf
Abstract	The dedicated UL channel resource allocation was adopted into the baseline in session #48. The per-link dedicated resource requirement can vary with time and the dedicated resource needed to be updated when necessary. This contribution proposes an effective approach to accurately update each link to enable fast convergence to the new appropriate size. It also proposes the extension of dedicated resource concept for the downlink to minimize the DL MAP allocation signaling overhead.
Purpose	To incorporate the proposed text into the P802.16j Baseline Document (IEEE 802.16j-06/026)
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Service Flow Based Dedicated Resource Update

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1. Introduction

The dedicated channel resource allocation was adopted into the baseline in session #48. This contribution addresses the ongoing update of this dedicated channel resource to support the varying traffic demand on each relay link.

An uplink dedicated resource may be allocated to each RS along the multi-hop path for the purpose of transporting control messages or aggregated data traffic. The dedicated channel allocation is between an MR-BS/parent RS and a child RS. By using this dedicated channel, the RS can transmit control messages or data traffic whenever necessary without having to request bandwidth and wait for bandwidth grant. The dedicated uplink channel enables a tight coupling between MR-BS with its RSs to serve MSs effectively.

Within the multi-hop network, the per-link dedicated resource requirement of the network topology can be very different. The requirement can also vary with time and the dedicated resource needed to be updated when necessary. This contribution proposes an effective approach to accurately update each link to enable fast convergence to the appropriate size for normal operation. It also proposes the extension of dedicated resource concept for the downlink to minimize the DL MAP allocation signaling overhead for the downlink subframe.

2. Proposed Solution

The proposed solution to support efficient dedicated resource update is based on the service flow creation, change and deletion of the MS. This is the logical choice as the per-link requirement is a function of all established service flows of each MS. Each service flow imposts specific resource requirement to all the intermediate RSs that are supporting it. As service flow can be established for either uplink or downlink, it is desirable to extend the dedicated resource allocation to the downlink and the same update process can be applied to reduce the DL MAP allocation signaling overhead.

The service flow creation shown in Figure 1 between the MR-BS and the specific MS will directly affect the resource requirements of relay link B and F. The amount of adjustment can be decided based on the service traffic characteristics included in the service flow creation signaling exchange. By using the service flow creation, change, and delete events to update the size of the dedicated channel, all necessary links that require update will be adjusted accordingly and enable a smooth transition to the new required size promptly without the need to detect it through traffic analysis that can be slow. Minor dynamic update after the service flow update allows the final convergence to the new appropriate size for the normal operation of the dedicated channel.

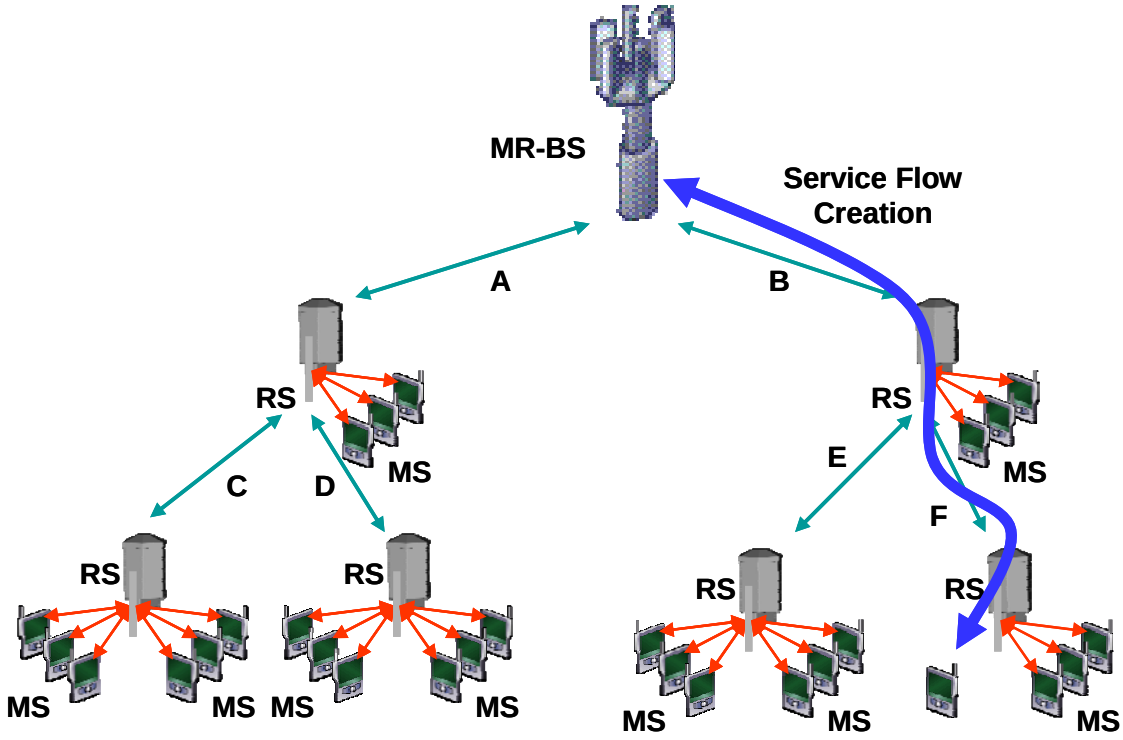

Figure 1: Service flow creation and corresponding dedicated resource update to relay links

Figure 2 and 3 depict respectively the signaling flow of downlink and uplink dedicated channel update right after the service flow creation. The MRBS determines the size of the update based on the detail service traffic information TLVs in the signaling exchange of DSA, DSC and DSD processes. The MRBS adjust the allocation to RS1 by sending the corresponding RS_DL_DCH assignment IE or RS-UL_DCH assignment IE. Upon receiving the assignment IE and the associated update information, in the next frame, RS1 can adjust its allocation to RS2 using the appropriate assignment IE.

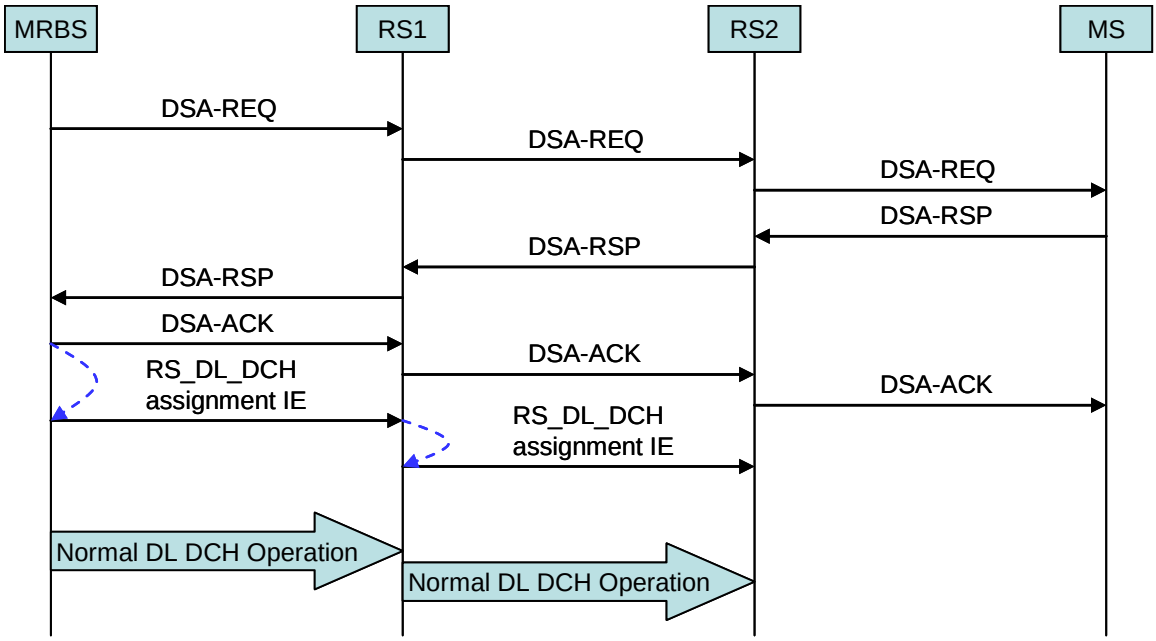

Figure 2: Downlink dedicated channel update after service flow creation

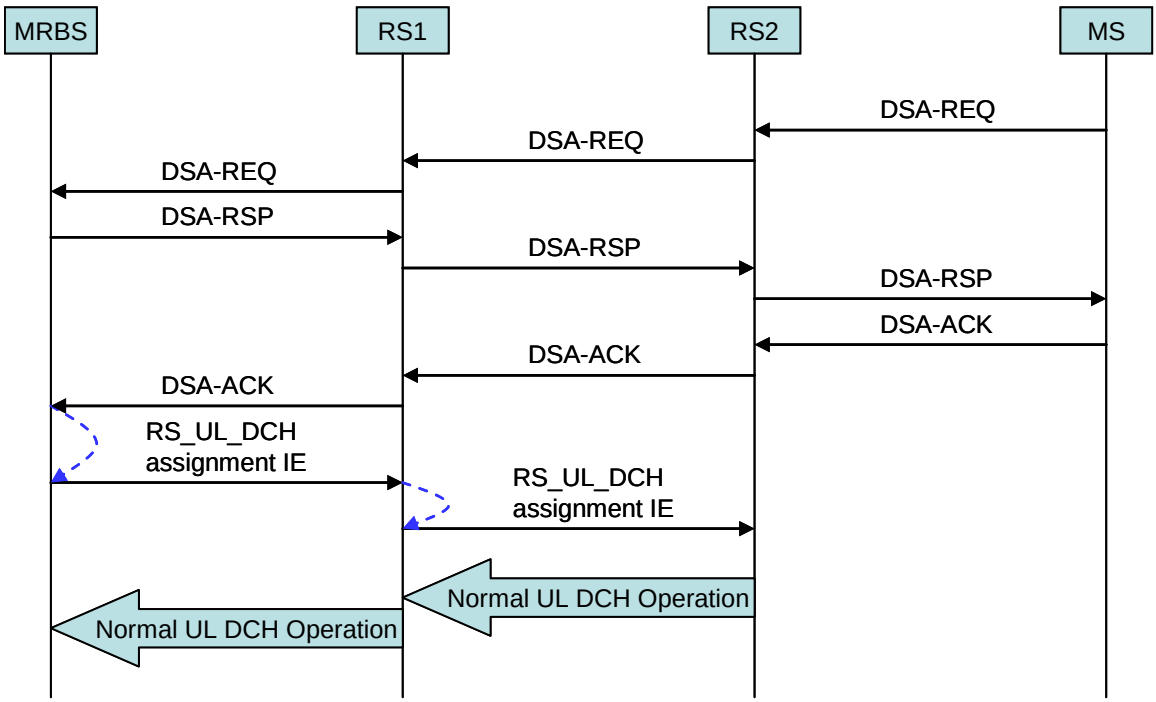

Figure 3: Uplink dedicated channel update after service flow creation

3. Text Proposal

++++++++++++++++ Start Text Proposal ++

[Change subclause 6.3.6.7.3 as indicated]

6.3.6.7.3 Dedicated relay ~~uplink~~ channel allocation

[Insert the following test at the end of 6.3.6.7.3]

The upstream serving station (MR-BS or RS) may also assign a downlink dedicated channel (RS DL_DCH) resource to its subordinate RS by sending the RS_DL_DCH assignment IE. Same as the uplink dedicated channel, it is a periodic allocation without the need to send R-MAP IE every time. It is used for the transport of control signaling and data traffic.

[Add the following section]

6.3.6.7.3.1 Service flow based dedicated resource update

The ongoing update of the uplink or downlink dedicated channel may be based on the service flow creation, change and delection of the MS. As the per-link dedicated resource requirement is a function of all established service flows of each MS, each service flow imposts specific resource requirement to all the intermediate RSs that are supporting it. The creation, deletion or change amount of each service flow has direct coupling to the

amount of resource that needed to be updated for each affected relay link. By using the service flow creation, change, and delete events to update the size of the dedicated channel, all necessary links that require update can be adjusted accordingly and enable a smooth transition to the new required size promptly without the need to detect it through traffic analysis that can be slow. Minor dynamic update after the service flow update allows the final convergence to the new appropriate size for the normal operation of the dedicated channel.

The MR-BS determines the size of the update based on the service traffic information TLVs in the signaling exchange of DSA, DSC or DSD process. The MRBS adjust the allocation to the specific first hop RS by sending the corresponding RS_DL_DCH assignment IE or RS-UL_DCH assignment IE. Within the assignment IE, the RS is also provided with the actual throughput size of the update and the CID of the access RS that is serving the specific MS. With these additional information the RS can determine which subordinate link needed to be updated and by how much. Upon receiving the assignment IE, in the next frame, the RS can adjust its allocation to its next hop link and so on until the link to the specific access RS is updated.

[Change subclause 8.4.5.9.1 as indicated]

8.4.5.9.1 RS UL DCH assignment IE

This IE is used for the initial allocation and subsequent updates of the uplink dedicated channel on the R-link.

Table XXX. RS_UL_DCH assignment IE format.

Syntax	Size	Notes
RS_UL_DCH assignment IE {		
Type	4 bits	
RSCID	8 bits	Reduced basic CID of the RS
Update type	2 bits	00 = Normal 01 = Service flow based
If (Update type == 01 {		**If service flow based update**
Throughput size	24 bits	Amount of throughput update in byte/s
Access RSCID	8 bits	Reduced basic CID of the access RS of the MS that completed the service flow event
}		
Assignment type	2 bits	00 = Incremental 01 = Deletion 10 = Aggregate
UL Resource allocation	x bits	Resources allocated to DCH
Frequency (N)	4 bits	Allocation repeats once every N frames
}		

The coding for the UL resource allocation to the DCH is TBD

[Add the following section]

8.4.5.9.2 RS DL DCH assignment IE

This IE is used for the initial allocation and subsequent updates of the downlink dedicated channel on the R-link.

Table XXX. RS_DL_DCH assignment IE format.

Syntax	Size	Notes
RS_DL_DCH assignment IE {		
Type	4 bits	
RSCID	8 bits	Reduced basic CID of the RS
Update type	2 bits	00 = Normal 01 = Service flow based
If (Update type == 01 {		**If service flow based update**
Throughput size	24 bits	Amount of throughput update in byte/s
Access RSCID	8 bits	Reduced basic CID of the access RS of the MS that completed the service flow event
}		
Assignment type	2 bits	00 = Incremental 01 = Deletion 10 = Aggregate
DL Resource allocation	x bits	Resources allocated to DCH
Frequency (N)	4 bits	Allocation repeats once every N frames
}		

The coding for the DL resource allocation to the DCH is TBD

++++++++++++++++ End Text Proposal ++