	IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>
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Re:	Call for technical proposals regarding IEEE project P802.16j
Abstract	This contribution proposes the scheme with which RS can support MS scanning operation under the direction of MMR-BS.
Purpose	Discussion and Adoption in IEEE 802.16j
Notice	
Release	
Patent Policy and Procedures	

MS scanning support by RS

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Introduction

In 802.16j, RS as an access station as well as MMR-BS should support MS scanning operation. We assume that the operation of RS to support the scanning operation for MS may vary on RS capability. RS may process the determining of scanning schedule for MS and the whole scanning negotiation procedures with MS, but in some instances RS should be involved in some scanning operations under the direction of MMR-BS. Based on pre-negotiated capabilities with its serving MMR-BS, RS just forwards scanning negotiation signals of MS and MMR-BS or RS composes scanning negotiation signals between RS and MMR-BS. We propose RS operation supporting MS scanning under MMR-BS's direction in this contribution.

Problem Statement

RS may have no capability to schedule MS data transmission and to control the MS, therefore the RS transmits user data or control signals as directed or scheduled by MMR-BS. In MS scanning operation, the RS may relay control signals including the scanning intervals determined by the MMR-BS or transmit the control signals as directed by the MMR-BS. In the latter case, the MMR-BS shall provide the RS with instructions that the RS makes the control signals of MS scanning and sends the control signals on behalf of the MMR-BS. RS also composes control signal to inform MMR-BS of MS scanning interval allocation request.

For clarification of the RS operation, we propose the way to support MS scanning operation as directed by MMR-BS.

Suggested Remedy

We propose an operation that an RS relays control messages of scanning negotiation between MMR-BS and MS. Upon receipt of scanning interval request from MS, the RS forwards the request to the MMR-BS and transmits a response with MS scanning intervals which is determined by the MMR-BS. The RS relays MOB_SCN-REQ message from MS or the RS can compose a new signal to inform MMR-BS of MS scanning interval allocation request. The response message is made by the MMR-BS or composed by the RS under the MMR-BS's control.

The MMR-BS may transmit a new control message to direct the RS to make MOB_SCN-RSP message with MS scanning intervals which are informed by the MMR-BS. If the MMR-BS makes MOB_SCN-RSP message for itself, the MMR-BS may give the RS the information of MS scanning intervals after transmitting MOB_SCN-RSP message to the MS.

If the RS receives a MAC PDU message or MOB_SCN-REP message from the MS, the RS relays the message to the MMR-BS.

Therefore we propose the remedies as follows:

- Clarification of the signaling of RS to support MS scanning operation
- A new control message to direct an RS to make MS scanning interval allocation response or to inform an RS of the MS scanning operation or to inform MS's scanning request
  - MMR_SCN-CMD message with MS scanning intervals
  - Indicator in MMR_SCN-CMD to direct the operation of MS scanning

Proposed Text Change

[Remedy1: Insert the followings at the end of section 6.3.22.1.2]

[Insert the followings at the end of section 6.3.22.1.2:]

AN RS as an access station relays the MOB_SCN-REQ message or MOB_SCN-RSP message between an MS and an MMR-BS. Upon receipt of MOB_SCN-REQ message, the RS may compose MMR_SCN-CMD with Command indicator set to 11 to inform MMR-BS of the MS scanning request. If the MMR-BS receives the MS scanning request relayed by the RS, the MMR-BS shall either grant the requesting MS a scanning interval, or deny the request.

If the MMR-BS denies MS scanning interval allocation request, the MMR-BS may make MOB_SCN-RSP message with scan duration = 0 and transmit the MOB_SCN-RSP to the RS. Upon receipt of MOB_SCN-RSP, the RS shall relay the MOB_SCN-RSP to the MS. The MMR-BS may transmit MMR_SCN-CMD with Command indicator=01 to direct the RS to make MOB_SCN-RSP with scan duration = 0. If the RS receives MMR_SCN-CMD with Command indicator=01, the RS shall make MOB_SCN-RSP with scan duration = 0 and transmit the MOB_SCN-RSP to deny MS's MOB_SCN-REQ.

Otherwise, the MMR-BS grants the scanning intervals for the MS with MOB_SCN-RSP message and the RS relays MOB_SCN-RSP to the MS. The MMR-BS may transmit MMR_SCN-CMD with Command indicator=10 to inform the RS that the MS is in scanning mode. The MMR-BS may transmit MMR_SCN-CMD with Command indicator=00 to direct the RS to make MOB_SCN-RSP including MS scanning intervals. In this case the MMR_SCN-CMD message has the information of scan result reporting and recommended MMR-BS or RS to be scanned as well as MS scanning intervals. If the RS receives MMR_SCN-CMD with Command indicator=00, the RS shall make MOB_SCN-RSP message as indicated in MMR_SCN-CMD and transmit the

MOB_SCN-RSP to the MS.
If an RS receives a MAC PDU message from an MS that is supposed to be in scanning mode, the RS shall resume the communication with the MS and forward the received MAC PDU to the MMR-BS.
When the RS receives MOB_SCN-REP message from the MS, the RS forwards the MOB_SCN-REP to the MMR-BS.

[Remedy 2: Insert the followings after section 6.3.2.3.61 at page 172]

[Insert new subclause 6.3.2.3.xx after section 6.3.2.3.61:]

6.3.2.3.xx MS Scanning Command (MMR_SCN-CMD) message

A MMR_SCN-CMD message may be transmitted by an MMR-BS to direct an RS to make MOB_SCN-RSP message or to inform an RS of MS scanning operation. A MMR_SCN-CMD message may also be transmitted by an RS to it's MMR-BS to inform MS's scanning request in which it shall set Command indicator to 11. If Command indicator is set to 00, the RS shall make MOB_SCN-RSP message with MS scanning intervals as instructed in MMR_SCN-CMD. In this case, the MMR-BS may give the RS the information of MS scan report and its recommended neighbor MMR-BS or RS to be scanned as well as scanning intervals.
If Command indicator is set to 01, the RS shall make MOB_SCN-RSP message with scan duration=0 to deny MS scanning interval allocation request. If Command indicator is set to 10, the RS assumes that the MS is in scanning mode as MS scanning intervals in MMR_SCN-CMD. If Command indicator is set to 11, the MMR-BS processes MS's scanning request.

A MMR-BS shall generate MMR_SCN-CMD messages in the format shown in Table x.

Table x – MMR_SCN-CMD message format

Syntax	Size	Notes
MMR_SCN-CMD_Message_format() {	-	
Management Message Type=TBD	8 bits	-
Command indicator	2 bits	This field indicates MMR-BS's direction or MS's scanning request. 00: make MOB_SCN-RSP with MS scanning intervals 01: make MOB_SCN-RSP with scan duration = 0 (to deny MOB_SCN-

		REQ) 10: inform of MS scanning operation 11: inform of MS scanning request
CID	16 bits	Basic CID of MS
If (Command indicator = 11){		
Scan duration	8 bits	in unit of frames
Interleaving interval	8 bits	in unit of frames
Scan iteration	8 bits	in unit of frames
N_Recommended_BS/RS	8 bits	Number of neighboring BS/RS
For(i=0; i<N_Recommeded_BS/RS; i++) {		
Recommended BS/RS ID	48 bits	ID of MMR-BSs or RSs that MS plans to scan
}		
}		
If (Command indicator==00 || Command indicator==10){		
Start frame	4 bits	Measured from the frame in which this message was received. A value of zero means that first scanning interval starts in the next frame.
Scan duration	8 bits	Duration (in units of frames) where the MS may perform scanning.
Interleaving interval	8 bits	Duration in frames. The period interleaved between scanning intervals when MS shall perform normal operation.
Scan iteration	8 bits	The number of iterating scanning interval.
If (Command indicator == 00){		
Report mode	2 bits	0b00: no report 0b01: periodic report

		0b10: event-triggered report 0b11: reserved
Report period	8 bits	Available when the value of Report mode is set to 0b01. Report period in frames.
Report metric	8 bits	Bitmap indicating metrics on which the corresponding triggers are based: Bit 0: CINR mean Bit 1: RSSI mean Bit 2: Relative delay Bit 3: RTD Bit 4-7: reserved; shall be set to zero
Reserved	4 bits	Shall be set to zero
N_Recommended_BS/RS	8 bits	Number of neighboring MMR-BS or RS to be scanned
For(i=0; i<N_Recommended_BS/RS; i++){	-	-
Recommended BS/RS ID	48 bits	ID of MMR-BSs or RSs that MS shall scan.
}		
}		
}		
}		