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Re:	Call for technical proposals regarding IEEE project P802.16j
Abstract	This contribution proposes the scheme with which RS supports MS scanning operation.
Purpose	Discussion and Adoption in IEEE 802.16j
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MS scanning support by RS

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Introduction

In 802.16j, RS as an access station as well as MR-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. Based on pre-negotiated capabilities with its serving MR-BS, RS just forwards scanning negotiation signals of MS and MR-BS or RS composes scanning negotiation signals. RS may process the determining of scanning schedule for MS and the whole scanning negotiation procedures with MS. We propose RS operation supporting MS scanning 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 MR-BS. In MS scanning operation, the RS may relay control signals including the scanning intervals determined by the MR-BS.

It is also assumed that a RS has a capability to schedule MS data transmission like MR-BS. In MS scanning operation, the RS may exchange control signals of scanning negotiation with MS and determine scanning schedule for MS. RS may inform MR-BS of MS scanning information so that MR-BS stops transmitting of MS data during MS's scanning and resumes the transmission after MS terminates its scanning mode.

Suggested Remedy

We propose an operation that an RS supports a scanning operation of MS based on RS capability. If an RS has no capability to schedule MS scanning interval, the RS relays control messages of scanning negotiation between MR-BS and MS. Upon receipt of a MOB_SCN-REQ message from MS, the RS forwards the

MOB_SCN-REQ to the MR-BS and transmits a MOB_SCN-RSP message with MS scanning intervals which is determined by the MR-BS. Similarly, the RS forwards the MOB_SCN-RSP message to MS when the RS receives an unsolicit MOB_SCN-RSP from the MR-BS.

Otherwise, an RS may determine the scanning intervals and responds with MOB_SCN-RSP message with the determined scanning intervals when the RS receives a MOB_SCN-REQ message from MS or the RS unsolicitly requests MS scanning operation by sending MOB_SCN-RSP. When the MS is in scanning mode, the RS may inform the MR-BS of MS scanning operation with a new control message MS_SCN-INF. If the MR-BS receives MS_SCN-INF message, the MR-BS stops transmitting MS's data and buffers the data during the scanning interval and transmits the data after the scanning interval during any interleaving interval or after exit of the scanning mode.

When the RS receives a MAC PDU message or MOB_SCN-REP message from the MS, the RS relays the message to the MR-BS. The RS may notify the exit of MS scanning to the MR-BS by transmitting a new control message MS_SCN-FIN.

Therefore we propose the remedies as follows:
- Clarification of the signaling of RS to support MS scanning operation
- A new control message to inform an MR-BS of MS scanning operation
  - MS-SCN-INF message with MS scanning intervals
  - MS-SCN-FIN message with the exit 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 and MOB_SCN-RSP message between an MS and an MR-BS. Upon receipt of a MOB_SCN-REQ message from MS, the access RS forwards the MOB_SCN-REQ to its serving MR-BS and transmits a MOB_SCN-RSP message with MS scanning intervals which is determined by the serving MR-BS. The access RS forwards the MOB_SCN-RSP message to MS when the access RS receives an unsolicit MOB_SCN-RSP from the serving MR-BS. If the serving MR-BS receives the MOB_SCN-REQ message relayed by the access RS, the serving MR-BS shall either grant the requesting MS a scanning interval, or deny the request.

In some instances an access RS may allocate scanning intervals to the MS. The access RS shall determine the scanning interval of MS and transmit MOB_SCN-RSP message when the access RS receives MOB_SCN-REQ message from an MS. The access RS may send MOB_SCN-RSP message as an unsolicit scanning request. If the access RS grants the scanning interval, the access RS may send MS_SCN-INF message to indicate its

serving MR-BS of MS scanning. The MS_SCN-INF message may include scanning intervals for one or more MSs. Upon receipt of MS_SCN-INF message, the serving MR-BS may buffer incoming data addressed to the MS during the scanning interval and transmit the data after the scanning interval during any interleaving interval or after exit of the scanning mode.

If the access RS receives a MAC PDU message from the MS that is supposed to be in scanning mode, the access RS shall resume the communication with the MS and forward the received MAC PDU to the serving MR-BS or may transmit MS_SCN-FIN message to the serving MR-BS to notify the exit of MS scanning.

When an access RS receives MOB_SCN-REP message from the MS, the access RS may keep the scanning result to configure HO candidates for the MS and forward the MOB_SCN-REP to its serving MR-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 Inform (MS_SCN-INF) message

A MS_SCN-INF message may be transmitted by an RS to inform a serving MR-BS of MS scanning operation. An RS may include the information of scanning intervals of one or more MSs in a MS_SCN-INF message.

An RS shall generate MS_SCN-INF messages in the format shown in Table x.

Table x – MS_SCN-INF message format

Syntax	Size	Notes
MS_SCN-INF_Message_format() {	-	
Management Message Type=TBD	8 bits	-
N_MS	8 bits	Number of MSs to perform scanning
For(j=0;j<N_MS;j++) {		
CID	16 bits	Basic CID of MS
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.
Padding	4 bits	Shall be set to zero
}		
}		

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

6.3.2.3.yy MS Scanning Finish (MS_SCN-FIN) message

A MS_SCN-FIN message may be transmitted by an RS to inform a serving MR-BS of the exit of MS scanning. An RS may include the information of scanning termination of one or more MSs in a MS_SCN-FIN message.

An RS shall generate MS_SCN-FIN messages in the format shown in Table y.

Table y – MS_SCN-FIN message format

Syntax	Size	Notes
MS_SCN-FIN_Message_format() {	-	
Management Message Type=TBD	8 bits	-
N_MS	8 bits	Number of MSs which exit a scanning operation
For(j=0;j<N_MS;j++) {		
CID	16 bits	Basic CID of MS
}		
}		