Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Fix the Problem of Scan/Association Type Indication in MOB_SCN-REQ/RSP Message**
Date Submitted	**2005-07-18**
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Re:	Call for contribution and comments.
Abstract	This contribution proposes method to fix the problem of scan/association type in MOB_SCN-REQ/RSP message.
Purpose	Adoption
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Fix the Problem of Scan/Association Type Indication in MOB_SCN-REQ/RSP Message

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Problem

Three Levels of scan /association are defined in 802.16e D9:
- Association Level 0 – Scan/Association without coordination
- Association Level 1 – Association with coordination
- Association Level 2 – Network assisted association reporting

BS and MS need to indicate the scan/association type in MOB_SCN-REQ &MOB_SCN-RSP messages. Currently a 3-bits field "association type" is defined in MOB_SCN-REQ / MOB_SCN-RSP messages and a method to indicate scan/association type using this field is described as following :
- Association type=0b000 : Association level 0 with scanning: association without coordination.
- Association type=0b001 : Association level 1 with scanning: association with coordination.
- Association type=0b010 : Association level 2 with scanning: NW assisted association reporting.
- Association type=0b011 : No association with scanning

One problem is that, while SCN-RSP was changed to allow the MS to report scanning results per neighbor BS with differentiated Association Type, the SCN-REQ was not similarly changed. That is, the MS can report that for neighbor BS 1, it used Association type 0, while for neighbor BS 2, it used Association type 1. So while the MS could report the differentiated Association type per neighbor BS scanned, the MS has no method to actually request to use different Association type per neighbor BS. The SCN-REQ message permits and requires designation of a single Association type method to be used for all neighbor BS designated in the message. Fortunately, this problem is easily fixed by using a similar method employed in SCN-RSP and applying it to SCN-REQ.

Another problem is that Association type in SCN-REQ was previously, correctly, changed to support the option of Scanning without Association. SCN-RSP was not similarly changed. Since Association is an optional feature, the SCN-REQ & SCN-RSP messages must support an Association Type selection that is Scanning without Association only. And certainly the use of Association Type in the two messages should match. However, the change in Association Type done in SCN-REQ was poorly performed. Because of the priority of sequencing in 11.8.3.7.16 Association type support, the option of Scanning without Association must occur as the first value of the option. Similar change must be performed in 11.8.3.7.16 to support the negotiated option of scanning without Association. Again, Association is an optional feature, so the negotiation of 11.8.3.7.16 must contain an option of Scanning without Association. Also, the use of the term 'Association Type' is entirely misleading since it implies that all scanning is for Association, which is certainly not true. Finally, 11.8.3.7.16 is not PHY specific and should be moved to general SBC capabilities negotiation from the OFDMA PHY specific

subsection. And delete the duplicate section 11.8.3.7.16.

Remedy

Fortunately, the identified Association type specification discontinuity problem between SCN-REQ & SCN-RSP is easily fixed by using a similar method employed in SCN-RSP and applying it to SCN-REQ.

And Association type support for scanning without Association is easily accommodated by adding a new value to Association type. Note that, due to selection precedence in 11.8.3.7.16 Association type support, the new value must be added as option '0'. Also, change 11.8.3.7.16 to correctly support the selection of no support for the optional Association feature. Also, change the term 'Association type' into the more correct term 'Scanning type'. Finally, 11.8.3.7.16 needs to be moved to11.8.8. And delete the duplicate section 11.8.3.7.15.

[Phil Barber] Added needed changes and fixes to invoking paragraph of 6.3.2.3.49, per C802.16e-05/333.

[Phil Barber] Added needed changes and fixes to invoking paragraph of 6.3.21.1.2, per C802.16e-05/333.

Proposed changes to text

[In 6.3.2.3.48 Scanning Interval Allocation Request (MOB_SCN-REQ) message, page 102, Table 108h—MOB_SCN-REQ message format, modify Table as:]

Table 108h—MOB_SCN-REQ message format

Syntax	Size (bits)	Notes
MOB_SCN-REQ_Message_format() {	--	--
Management Message Type = 54	8	
Scan duration	8	Units are in frames.
~~**Association type**~~	~~3~~	~~0b000:Association level 0 with scanning: association without coordination.~~ ~~0b001:Association level 1 with scanning: association with coordination.~~ ~~0b010:Association level 2 with scanning: NW assisted association reporting.~~ ~~0b011: No association with scanning~~ ~~0b100-0b111:~~ *~~Reserved~~*
Interleaving interval	8	Units are frames.
Scan Iteration	8	In frames
Comp_NBR_BSID_IND	1	1 = use compressed BS ID
Padding	~~4~~7	Shall be set to zero
If (Comp_NBR_BSID_IND ==1) {		
Configuration change count for MOB_NBR_ADV	8	Configuration Change Count value of referring MOB_NBR_ADV message
}		
N_Recommended_BS	8	Number of neighboring BS's to be scanned/associated

For (j=0; j<N_Recommended_BS; j++) {		
If (Comp_NBR_BSID_IND == 1) {		
Neighbor_BS_index	8	BS index corresponds to position of BS in MOB_NBR_ADV message
} Else {		
Recommended BS_ID	48	
}		
~~Association~~ Scanning type	3	0b000:Scanning without Association~~Association level 0 with scanning: association without coordination.~~ 0b001:Scanning with Association level 0: association without coordination~~Association level 1 with scanning: association with coordination.~~ 0b010:Scanning with Association level 1: association with coordination~~Association level 2 with scanning: NW assisted association reporting.~~ 0b011: Scanning with Association level 2: NW assisted association~~No association with scanning~~ 0b100-0b111: *Reserved*
}		
Padding	*variable*	If needed for alignment to byte boundary.
TLV encoded information	*variable*	
}		

[In 6.3.2.3.48 Scanning Interval Allocation Request (MOB_SCN-REQ) message, page 104, lines 3-5, modify as:]
~~Association~~ **Scanning type**
     Type of scanning or association to be used by the MS and coordinated by the Serving BS (if Association type >=~~0b0100~~0b011).

[In 6.3.2.3.49 Scanning Interval Allocation Response (MOB_SCN-RSP) message, page 104, line 32-37, modify as:]
A MOB_SCN-RSP message shall be transmitted by the BS either unsolicited or in response to an MOB_SCN-
REQ message sent by an MS. A BS may transmit MOB_SCN-
RSP to start MS scan reporting with or without scanning allocation. A BS may allocate the scanning allocation for MS scanning with Scanning type = 0b000, or MS non-contention Association ranging with Scanning type = 0b010 or 0b011. The message shall be transmitted on the Basic CID.

[In 6.3.21.1.2 MS Scanning of neighbor BSs, page 171, line 28-49, modify as:]
When the Trigger Action in the DCD message in encoded as 0x3, the MS shall send the MOB_SCN-
REQ message to the BS to begin the neighbor BS scanning process when the trigger condition is met. In the MOB_SCN-
REQ message the MS (the MOB_SCN-
RSP message the BS) shall indicate group of neighbor BSs for which only Scanning or Scanning with Association are requested by MS (recommended by BS). Presence of those BSs for which Association is requested (recommended) is indicated by encoding of Scanning type >= 0b001. The BS may negotiate over the backbone with a BS Recommended for Assocation allocation unicast ranging opportunities. Then the MS will be informed on Rendezvous time to conduct Association ranging with the Recommended BS. When conducting initial ranging to a BS recommended for Association, MS shall use allocated unicast ranging opportunity, if available. Regardless of the presence of Recommended BS IDs, MS may determine and perform any scanning or Association activities during Scanning Interval at its own discretion. When the Report Mode is 0b10 in the MOB_SCN-
RSP message, the MS shall scan all BSs within the Recommended BS list of the message and then report the scanning result with the MOB_SCN-
REP message as conditioned by specified trigger event. Particularly if the Trigger Function in the most recently-
received DCD channel encoding is 0x5 or 0x6, the MS shall include all recommended BSs of the MOB_SCN RSP within the MOB_SCN-
REP. Otherwise, the MS shall add only the BSs which met the Trigger Function conditions within the MOB_SCN-
REP message. The scanning duration performed by the MS on all neighbor BSs shall be no longer than the parameter Max_Dir_Scan_Time (as specified in Section 10.1) to limit the time before a report is sent to the BS.

[In 6.3.2.3.49 Scanning Interval Allocation Response (MOB_SCN-RSP) message, page 104, Table 108i—MOB_SCN-RSP message format, modify Table as:]

Table 108i—MOB_SCN-RSP message format

Syntax	Size (bits)	Notes
MOB_SCN-RSP_Message_format() {		
Management Message Type = 55	8	
Scan duration	8	In units of frames. When Scan Duration is set to zero, no scanning parameters are specified in the message. When MOB_SCN-RSP is sent in response to MOB_SCN-REQ, setting Scan Duration to zero denies MOB_SCN-REQ.
Report mode	2	0b00: no report 0b01: periodic report 0b10: event triggered report 0b11: reserved
reserved	6	Shall be set to zero
Report period	8	Available when the value of Report Mode is set to 0b01. Report period in frames.
Report metric	8	Bitmap indicating metrics on which the corresponding triggers are based: Bit 0: BS CINR mean Bit 1: BS RSSI mean Bit 2: Relative delay Bit 3: BS RTD; this metric shall be only measured on serving BS/anchor BS. Bits 4-7: *reserved*; shall be set to zero
if (Scan Duration !=0) {		
Start frame	4	
reserved	1	Shall be set to zero.
Interleaving interval	8	Duration in frames
Scan iteration	8	
Comp_NBR_BSID_IND	1	
padding	3	Shall be set to zero.
If (Comp_NBR_BSID_IND == 1)		
Configuration change count for MOB_NBR_ADV	8	Configuration Change Count value of referring MOB_NBR_ADV message
}		
N_Recommended_BS	4	Number of neighboring BS's to be scanned/associated
For (j=0; j<N_Recommended_BS; j++) {		
If (Comp_NBR_BSID_IND == 1) {		
Neighbor_BS_index	8	BS index corresponds to position of BS in MOB_NBR_ADV message
} Else {		
Recommended_BS_ID	48	BS IDs of BSs that MS shall scan
}		
~~**Association**~~ **Scanning** **type**	3	0b000: <u>Scanning without Association</u>~~Scanning with association level 0: association without coordination~~ 0b001: <u>Scanning with Association level 0: association without coordination</u>~~Scanning with association level 1:association with coordination.~~ 0b010: <u>Scanning with Association level 1: association with coordination</u>~~Scanning with association level 2: NW assisted association reporting.~~ <u>0b011: Scanning with Association level 2: NW assisted association</u>

			0b0110b100-0b111: Reserved
If (Association type == 0b001) OR (Association type == 0b010) {			
Rendezvous time	8		Units are frames
CDMA code	8		From initial ranging codeset
Transmission_opportunity offset	8		Units are transmission opportunity
}			
}			
Padding	*variable*		
}			
TLV encoded information	*variable*		
}			

[In 6.3.2.3.49 Scanning Interval Allocation Response (MOB_SCN-RSP) message, page 106, lines 33-34, modify as:]

~~Association~~ **Scanning** type

Type of scanning or association ~~to be~~ used by the MS and coordinated by the Serving BS (if Association type >=0b011).

[In 11.8.3.7.16 Association type support, page 542, modify Table as:]

Type	Length	Value	Scope
167	1	0: Scanning without Association: Association not supported ~~0~~1:Association level 0: Scanning or association without coordination. ~~1~~2:Association level 1: association with coordination. ~~2~~3:Association level 2: NW assisted association ~~reporting~~. 4-255 reserved	SBC-REQ (see 6.3.2.3.23) SBC-RSP (see 6.3.2.3.24)

[Relocate 11.8.3.7.16 Association type support, page 542, to new subsection 11.8.8:]

[Delete duplicate section 11.8.3.7.15 Association type support, page 542; note: 11.8.3.7.15 is duplicate to 11.8.3.7.16, but 11.8.3.7.16 has some different, more correct language after the Table, so should kill .15 not .16]