Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Treatment by OBS on error report in IBS_IPBC procedure**
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Re:	80216h-05_023：Call for Contributions: IEEE 802.16 License-Exempt Task Group 2005-10-17
Abstract	To consolidate the procedure on dealing with the error report from the SSs that fail to receive the whole message of IBS_IPBC, the OBS can judge the interference source by comparing the frame number in the report message.
Purpose	To consolidate the coexistence neighbor discovery procedure
Notice	
Release	
Patent Policy and Procedures	

Treatment by OBS on error report in IBS_IPBC procedure

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Background[2]

Coexistence Time Slot

CTS (Coexistence Time Slot): a predefined time slot for the coexistence protocol signaling purpose, especially for the initializing BS to contact its coexistence neighbor operating BS through one or more coexistence neighbor SSs in the common coverage area.

CTS must not be used for other purpose by all the BSs, so that it will be an interference free slot for the coexistence neighbor discovery purpose. Initializing BS (IBS) shall use this slot to broadcast its IP identifier, by sending a message and/or by cognitive radio signaling, so that the coexistence neighbor operating BS (OBS) could find the new coexistence neighbor in IP network after the SS report the message. Then the IBS and OBS begin further negotiation for coexistence protocol.

Not to break the downlink PDU, and to prevent overhead of more preamble and gaps. CTS slots shall be located before RTG/TTG in TTD frame structure or before the preamble of downlink frame in FDD frame structure .To unify the location in these two kind of duplexing frame , CTS slots in FDD frame shall be put into the downlink structure right before the preamble, and shall be located right before RTG in TDD frame.

The broadcasting procedure is unidirectional, only from the IBS to the SSs in IBS/OBS's common coverage, and the SSs shall report all the useful information to their OBSs they registered to. If the message will be forward correctly to the OBSs, the OBSs will then find the IBS in the IP network, and go further signaling using IP network.

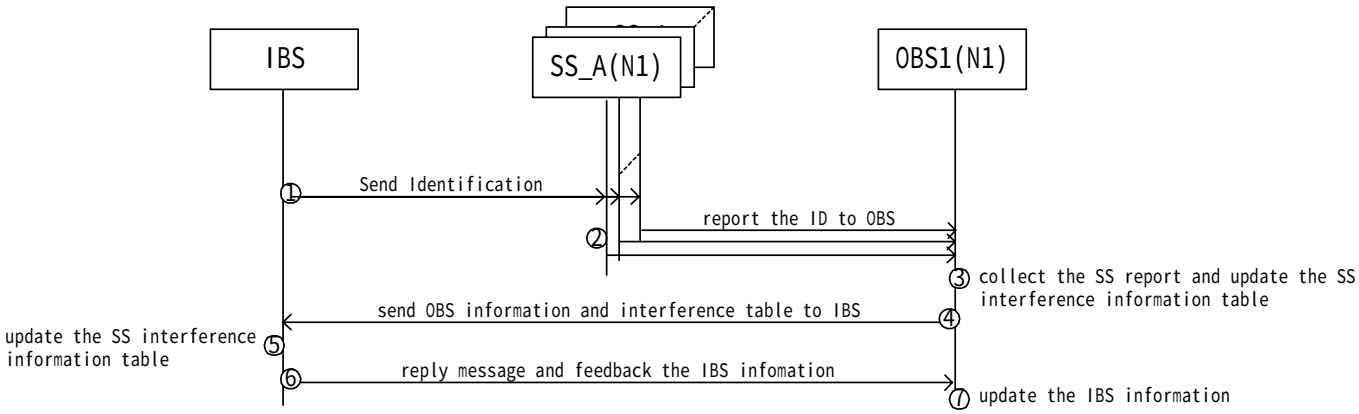

figure: CTS usage example- IBS broadcasting IP address to coexistence neighbor's SS

Reference:

[1] *IEEE802.16-2004: IEEE standard for Local and metropolitan area networks Part16: Air Interface for Fixed Broadband Wireless Access Systems 2004-10-01*

[2] *IEEE 802.16-05/022: working document Amendment for Improved Coexistence Mechanisms for License-Exempt Operation 2005-09-28*

Considering on current procedure

Usually there are more than one SS existing in the common coverage area between IBS and OBS. It may happen that some SS in this area can decode the whole IPBC message and some does not, e.g, because of disturbance by other signal, some old SS can not decode the CTS symbol, or the other reason. So some SSs can not correctly report the message to its operating BS (OBS) , and the OBSs can not collect these interference status in the IBS_IPBC procedure.

Assumption:

All the Base Stations forming a community will have synchronized MAC frames and frame number.

The SS will report different information based on the result they got from the receiving of the IBS_IPBC:

When SSs success in receiving the broadcasting message and pass the checking, it means SS got the right information of the interference source, and will report to the IP address of IBS and the frame number of the time it start receiving the IBS_IPBC message to OBS using REP_RSP message.

When SSs got IBS_IPBC like interference in CTS but fail to decoding the message or verify the CRC checking for the message. The SSs can only report the error status and the frame number in which frame that it got interfered. The error status may indicate as some of the case below and so on:

- not capable to decode the energe pulse symbol.;
- not able to find the eligible <SOF>;
- not able to find the eligible <EOF>;
- not able to pass the CRC check for message;

OBS got all the interference victim SSs' report, some of SSs have the right IP address in the report and others will report the error they have met in the IBS_IPBC receiving. By checking the frame number in the report, OBS can find that these SSs have the same interference source, and got the IP address of the interference source (IBS) from the SSs that report the right IP address.

Proposed Text changes in working document:

[change the 5th bullet of the first paragraph in 15.2.1.1.3 into the following]

- All the Base Stations forming a community will have synchronized MAC frames and frame number

[change the forth paragraph of 15.2.1.1.3 into the following section]

The broadcasting procedure is unidirectional, only from the IBS to the SSs in IBS/OBS's common coverage, and the SSs shall report all the useful information to their OBSs they registered to. The SSs that succeed in receiving the message should report the IP address of IBS and the frame number of the starting frame of IBS_IPBC, the SSs failed to received the broadcasting message but got IBS_IPBC like interference in the CTS should report the error status and the starting frame number of receiving the CTS interference. ~~If the message will be forward correctly to the OBSs,~~ By the IBS IP address reported from the SSs, the OBSs will then find the IBS in the IP network, and go further signaling using IP network. And by checking the frame number in the report, OBS need to find out if the SSs that report the error status in IBS_IPBC receiving have got the same interference source, then OBS will update the database and reply to the SSs which send the error report.

[change the figureh10 to the following]

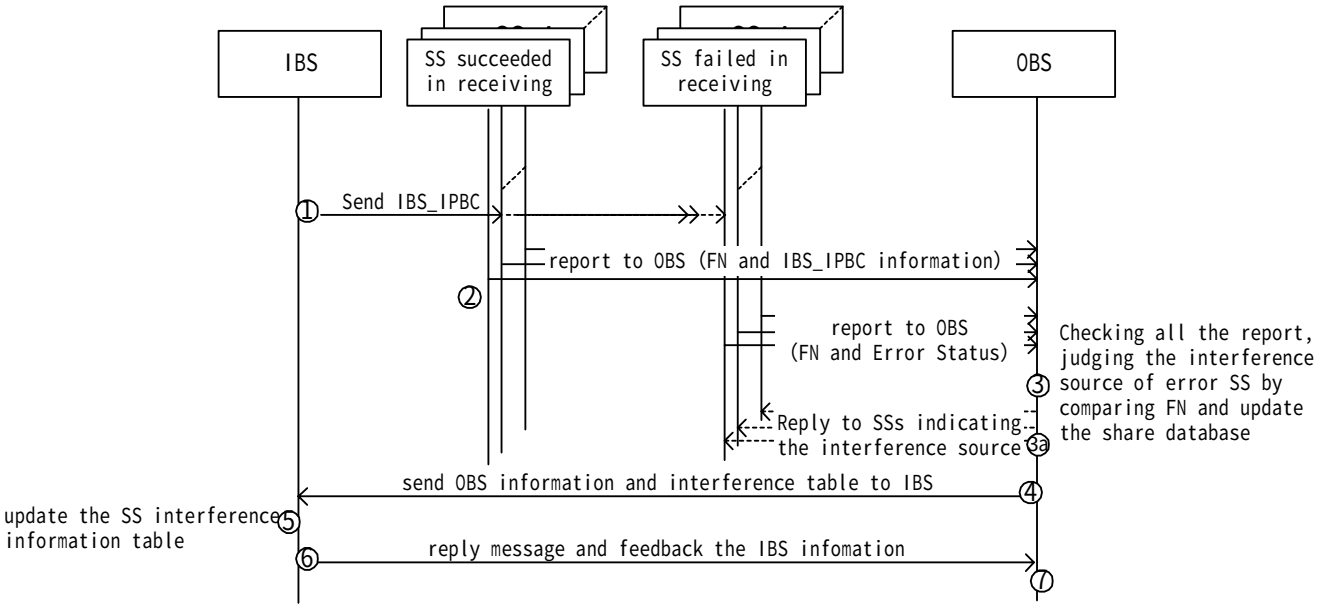

figure h10: CTS usage example- IBS broadcasting IP address to coexistence neighbor's SS

[change the tables in 15.2.2.4 to the following (editorial)]

Table h2. This BS information table

Syntax	Size	Notes
This BS information table(){		
BSID	48bits	
Operator ID	?bits	
IP address	32bits	IPv4 address
Master resource ID	8bits	Sub-frame number
Negotiation status	8bits	Bit0: get communication in the IP network Bit1: be registered in Bit2: registered to Bit3: done for resource sharing(if neighboring) Bit4-7: tbc.
CTS parameter(){		Regulated by region/country

Tcts_start	16bits	In microseconds
Tcts_duration	8bits	In microseconds
Period of frames	8bits	frames
Starting frames offset	16bits	frame serial number of the first frame that CTS presented
Length of Symbols	8bits	In microseconds, need to be 1/n of Tcts_duration
}		
~~Coexistence neighboring~~	~~1bit~~	~~Coexistence neighbor with this BS?~~ ~~1 yes~~ ~~0 no~~
~~If (Coexistence neighbor){~~		
~~Number of victim SSs~~	~~16bits~~	~~The number of victim SSs of this CoNBR, in this network~~
~~for (I = 1; I <= n; i++) {~~		
~~SSID~~	~~48bits~~	
~~RSSI~~	~~16bits~~	~~1byte RSSI mean (see also 8.2.2, 8.3.9, 8.4.11) for details)~~ ~~1byte standard deviation~~
~~(tbc.)~~	~~(tbc.)~~	~~(tbc.)~~
~~}~~		
~~}~~		
Number of CoNBRs	8bits	m:The number of coexistence neighbors of this BS
for (i= 1; i <= m; i++) {		
BSID	48bits	
(Tbc.)	(Tbc.)	(Tbc.)
}		
Profile(){		
Band		
PHY mode(){		
Modulation		
(Tbc.)		
}		
Maximum power	8 bits	dbm
Number of registered SS	12bits	n
for (~~I~~i = 1; ~~I~~i <= n; i++) {		
SSID	48bits	
(tbc.)	(tbc.)	(tbc.)
}		
(tbc.)	(tbc.)	(tbc.)
}		
}		

Table h3. BS information table

Syntax	Size	Notes
BS information table(){		
Index	16bits	
BSID	48bits	
Operator ID	?bits	
IP address	32bits	IPv4 address
Sector ID	8bits	
Master resource ID	8bits	Sub-frame number
Negotiation status	8bits	Bit0: get communication in the IP network Bit1: be registered in Bit2: registered to Bit3: done for resource sharing(if coexistence

		neighboring) Bit4-7: tbc.
Coexistence neighboring	1bit	Coexistence neighbor with this BS? 1-yes 0-no
If (Coexistence neighbor){		
Number of victim SSs	16bits	n:The number of victim SSs of this coexistence neighbor, in this network
for (i = i; i <= n; i++) {		
SSID	48bits	
RSSI	16bits	1byte RSSI mean (see also 8.2.2, 8.3.9, 8.4.11) for details) 1byte standard deviation
}		
(Tbc.)	(Tbc.)	(Tbc.)
}		
Number of Coexistence neighbors	8bits	m:The number of coexistence neighbors of this BS
for (i= 1; i <= m; i++) {		
BSID	48bits	
(Tbc.)	(Tbc.)	(Tbc.)
}		
Profile(){		
Band		
PHY mode(){		
Modulation		
(Tbc.)		
}		
Maximum power	8 bits	dbm
Number of registered SS	12bits	
(tbc.)	(tbc.)	(tbc.)
}		
(tbc.)	(tbc.)	(tbc.)
}		

Table h4. SS information table

Syntax	Size	Notes
SS information table(){		
Index	16bits	
SSID	48bits	
Interference status	1bit	Interfered by coexistence neighbor? 1-yes 0-no
If (Interfered){		
Number of source BSs	8bits	n:The number of interference source of coexistence neighbor
for (~~I~~i = 1; ~~I~~i <= n; i++) {		
BSID	48bits	
IBS_IPBC detected	1bits	1-yes 0-no
If (IBS_IPBC detected){		
IP address	32bits	If the IBS_IPBC message detected, the IP address report by the SS will add here, and updating the bit above
Sector ID	?bits	Reported by SS
~~FSN~~ Frame number	~~16~~24bits	Reported by SS
Error Status	?bits	0 -no error

		1 - not capable to decode the energe pulse symbol.; 2 - not able to find the eligible <SOF>; 3 - not able to find the eligible <EOF>; 4 - not able to pass the CRC check for message;
(tbc.)	(tbc.)	(tbc.)
}		
RSSI	16bits	1byte RSSI mean (see also 8.2.2, 8.3.9, 8.4.11~~)~~ for details) 1byte standard deviation
(tbc.)	(tbc.)	(tbc.)
}		
(tbc.)	(tbc.)	(tbc.)
}		
(tbc.)	(tbc.)	(tbc.)
}		

[change the tables in 15.2.2.4 to the following (editorial)]

11.11 REP-REQ management message encodings

insert the following entry in the second table of 11.11:

Coexistence neighbor Interference Report	1.9	1	Bit #0: 1-include IP address received in IPBC Bit #1: 1-include RSSI of CTS symbols(only valid when bit#0 is set to one) Bit #2: 1-include ~~FSN~~Frame number~~–~~that start to receive IPBC Bit #3~7: reserved, shall be set to zero

11.12 REP-RSP management message encodings

insert the following entry in the first table of 11.12:

Coexistence neighbor Report	7	variable	Compound

~~11.12 REP-REQ management message encodings~~

insert the following table into 11.12 as indicates:

Coexistence neighbor Interference Report type	Name	Type	Length	Value
all	CoNBR count	7.1	1	Bit #0:1-New CoNBR Discovered by IPBC

	/New NDS			received Bit #1-7:The number of CoNBR that interference to this SS
bit #0=1	CoNBR IP address	7.2	4	4bytes IP address of CoNBR interference to this SS, 255. 255. 255. 255 indicate the fail of CRC check.
bit #1=1	CoNBR IP address with RSSI	7.3	2	1byte RSSI mean (see also 8.2.2, 8.3.9, 8.4.11) for details) 1byte standard deviation
Bit #2=1	Starting Frame Serial Number of IPBC	7.4	~~2~~ 3	Bit# 0-~~10~~24: ~~FSN~~ Frame number of IPBC starting frame ~~Bit#11-15: reserved~~