Project	IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>	
Title	Status Report about the Ad-Hoc on Interference Management	
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Re:	IEEE 802.16 Working Group Letter Ballot #24, on P802.16h/D1	
Abstract	In this contribution, some problems discussed in the interference management ad-hoc group are provided for TG consideration.	
Purpose	Introduce problems on interference management and call for solutions to these problems.	
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Status Report about the Ad-Hoc on Interference Management

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Introduction

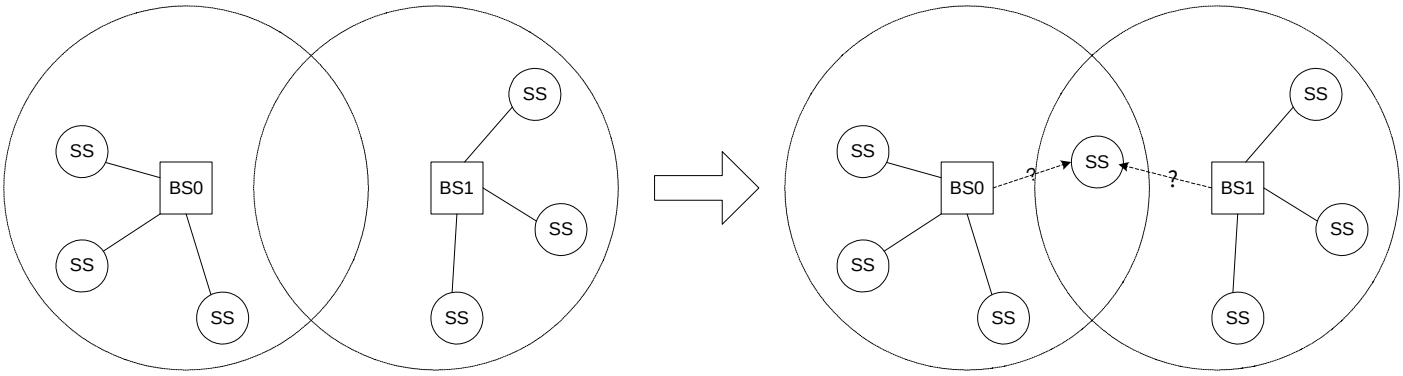
As the action item of meeting #46 in Mont Tremblant, an ad-hoc group discussing the interference management in network entry and operating stage is created. This ad-hoc mainly focuses on the problems proposed in contribution C802.16h-06/094[2]. At the meeting #47 in Dallas, contribution C802.16h-06/113[3] also gives some problems related to this topic. I'm responsible for continuing the ad-hoc. Unfortunately, we haven't gotten solution to the problem we have found.

In this contribution, I'd like to update the status of this ad-hoc. Hope you to pay attention to this ad-hoc and give your contributions to this topic.

Problems need to be resolved

1. Blind Area

SSs in the overlapped area of two BSs may help to interference identification. If no SS exits in the overlapped area, systems may operate independently of each other and be unaware of each other's existence. If a newly entering SS located in the overlapped area tries to enter network, it may fail because of heavy uncoordinated interference. Then the undetected potential interference makes the overlapped area a communication blind area.



Possible Solutions to this problem

1) There are 4 sub-frames and system can own only sub-frame as master. If the each system selects randomly its master sub-frame, then the probability of blind area may decrease.

   Consideration about this solution:

   - ☐ May system select randomly its master sub-frame?

2) Initial SS in the blind area may use CMI/CSI to detect the interference. In CX_CC slot, initial ranging opportunity may send to SS in the blind area to report its detection. Then two systems can coordinate to avoid interference.

Some considerations about this solution:

- ☐ May SS wait for so much time on each channel? For current CXCC parameter sets, SS should stay at least 15seconds on each channel.
- ☐ May BS decode the UL data correctly without performing ranging?
- ☐ Predefined UL PHY profile should be used for the SS.
- ☐ CMI claimed by each system may conflict because of no coordination with each other.
  - ■ SS in blind area can't identify interference in this situation even in the CX-CC slot.
- ☐ May CMI slot claimed by one system is bonded with its master sub-frame index or the number of CMI_D slot is equal to the maximum number of sub-frame?
  - ■ If the answer is yes, then this solution is no better than the solution 1.

3) Reserving a zone during master sub-frame for SS in the blind area. This zone should be large enough for SS reporting channel measurement and random enough to avoid conflict.

Consideration about this solution:

- ☐ How about the influence on the system efficiency?

4) BS may work on more than one channel [4].

Consideration about this solution:

- ☐ Frequency hopping may make the system complex and may have influence on the absolute time synchronization.

2. Channel Measurement in the operating stage

System needs to perform non-working channel measurement in the operating stage to find anther idle channel or less crowded channel. System may use EQP for this purpose in UCP. We need specify the non-working channel measurement in the operating stage for CP.

Possible Solution to this problem

Using quiet period, such as slave ICSI/OCSI/CMI or other quiet period for non-working channel measurement. See contribution C802.16h-06_105r2[5] for details.

3. Interference status changes

In contribution C802.16h-06_113[3], four cases about scenario of coexistence are proposed:
CASE I: SS initializing in blind area between non-neighbor systems in operation stage, while the systems are within one community/ neighborhood.
CASE II: SS initializing in blind area between non-neighbor systems in operation stage, while the systems are not within one community.
CASE III: Systems in operation stage become neighbor because of the environment change.
Case IV: Listen-before-talk invalidation case for operating WirelessMAN-CX system

Among them, case 2 in [3] is the blind area problem and I have given some considerations on it. OCSI collusion detection in case 2 is resolved by contribution C802.16h-06)114r2 [6]. We need further contributions

to solve other problems.

3. SS network entering in the overlapped area

When SS in the overlapped area enters network, its initial ranging request may be received by two BSs. We need specify the mechanism that can avoid the concurrent but independent response from two BSs to one SS. Contribution C80216h-06/120 [7] gives some considerations on SS ranging. We need further discussion on this problem.

Conclusion

We need to further study the cases that may be not considered in current working draft [1] and give solution to every possible problem.

Reference

[1] IEEE 802.16h-D1: Air Interface for Fixed Broadband Wireless Access Systems: Amendment for Improved Coexistence Mechanisms for License-Exempt Operation
[2] C80216h-06_094, Dynamic Interference Maintenance in Coexistence Community
[3] C80216h-06_113r1, Full case study on the scenario of coexistence
[4] C80216h-06_103, A method which can improve capacity in WirelessMAN-CX
[5] C80216h-06_105, Using Quiet Period for Channel Measurement
[6] C80216h-06_114r2, OCSI Collusion detection and resolution between systems
[7] C80216h-06_120, Proposed enhancement in the ranging procedure