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Re:	Call for Comments and Contribution, "IEEE 802.16's License-Exempt (LE) Task Group
Abstract	This contribution proposes some interference relationship transform **scenarios** in the coexistence community, including interference relationship release, potential interference detection and seeking for another idle channel.
Purpose	Suggest **considering** dynamic interference maintenance when developing 16h standard.
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Dynamic Interference Maintenance in Coexistence Community

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Introduction

Latest 16h working document [1] has designed detailed BS community entry procedure but hasn't consider more about the interference maintenance in operating stage. In this contribution, we give some interference transform scenarios which should be considered when BS is in operating stage, including the detection of potential interference, interference relationship release, and idle channel detection.

Interference Relationship Release

The latest 16h working document [1] has defined the community entry procedure of new BS and has specified how to create new sub-frame when new BS enters community. But the current working document has specified how to release the interference neighbor relationship.

We can see the following figure. If there are SSs active in the co-coverage area of BS0 and BS1, there is interference relationship between BS0 and BS1. BS0 and BS1 need coordinate to prevent interference. If for some reason, such as SS powers off or moves away, there is no SS in the co-coverage area of BS0 and BS1, then no need to maintenance the interference relationship between BS0 and BS. A new frame structure may be preferable.
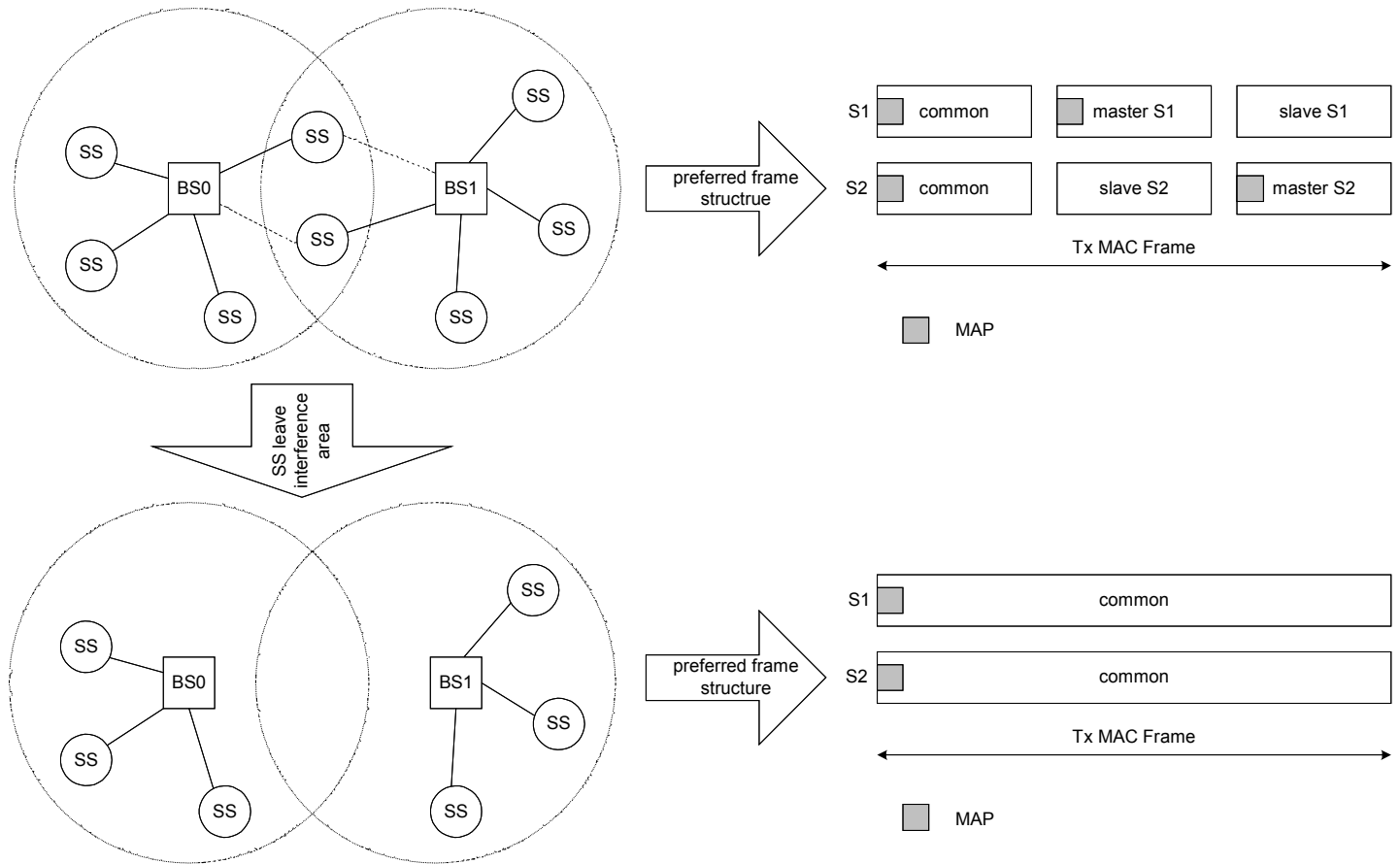
Figure 1 updating frame structure when interference relationship releases

Interference release may improve resource efficiency. If possible, interference release mechanism should be considered.

Potential Interference Detection

In the latest 16h working document [1], CMI/CSI are defined for the interference detection. When an IBS enters network, it will select a free CMI/CSI to broadcast its coexistence message and the SSs in the IBS coverage which has associated with one of OBS. It will detect IBS's broadcast message and report the IBS's message to its serving BS. Then IBS and OBS can negotiate and communicate with each other to prevent interference.

This interference method must meet two conditions: there is a SS in the co-coverage area of IBS and OBS, and the SS has entered network and associated with the OBS. If there is no any SS which has associated with the OBS in the co-coverage area, then IBS and OBS may not know the existence of each other and IBS may select the channel used by OBS and enter network. For example, when BS0 enters network, there is not SS between the co-coverage area of BS0 and BS1, so BS0 may select the same channel with BS1 without interference. If

there is no any SS in the co-coverage area of BS0 and BS1, then no need to consider the interference between BS0 and BS1.

If for some reason, there is an SS in the co-coverage area of BS0 and BS1, such as SS powered on. It will receive the interfered signal for BS0 and BS1 and may not perform network entering successfully because of heavy interference. So the co-coverage area of BS0 and BS1 will be blind area until they know each other. We called BS0 is the potential interference of BS1 and vice versa.
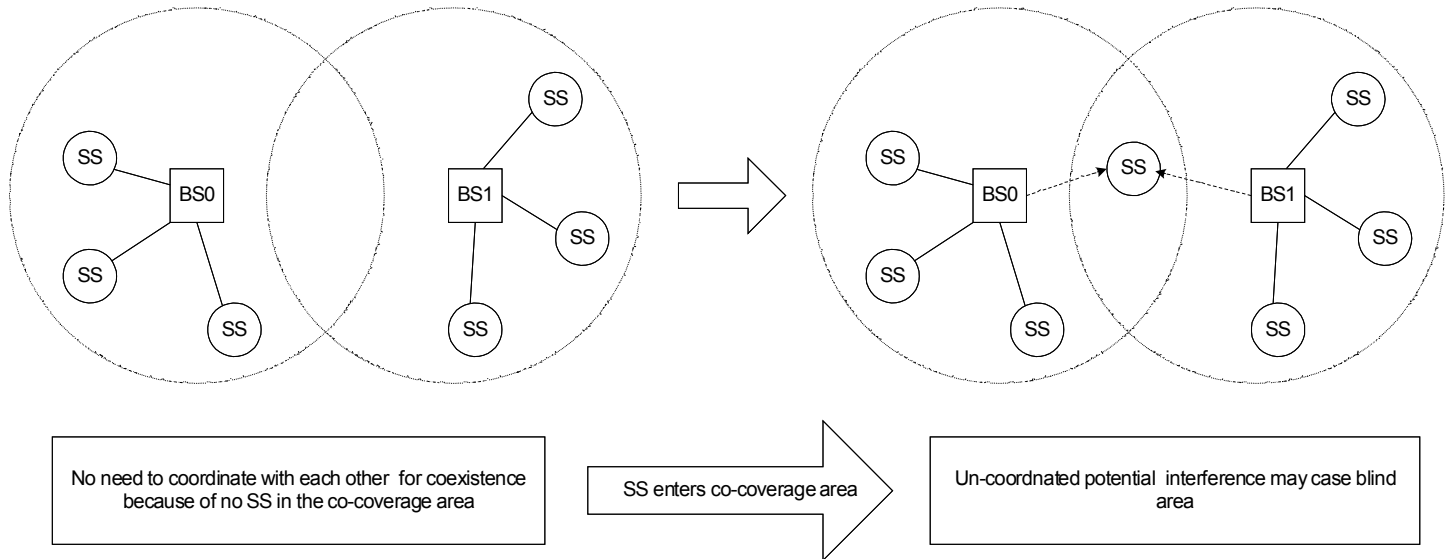
Figure 2 heavy uncoordinated potential interference may cause blind area

The matter described above may occur popularly because BSs are always installed and enter network before the SS powers on. Then the blind area will heavily reduce the available coverage, see following figure for example.
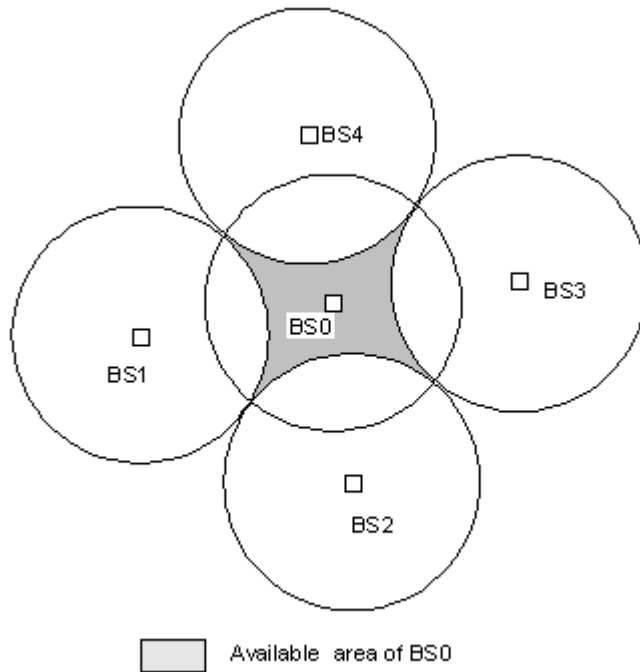
Figure 3 available coverage area of BS0

The problem mentioned above may be not so serious. SS in the co-coverage area of uncoordinated potential interference neighbor may complete the network entry procedure if the interference is not so bad. As the following figure shows, SS0 may enter network in low SNR and associate with BS0. It will sense the interference of BS1 in CMI/CSI and report to BS0. BS0 and BS1 can then negotiate to avoid interference.
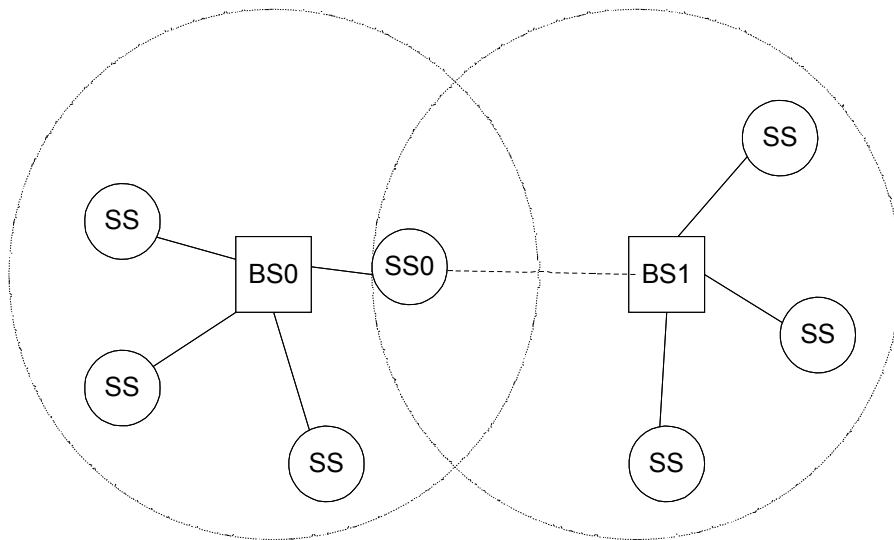
Figure 4 interference detection via working SS

Anyway, we think the potential interference is possible and a mechanism to avoid blind area should be considered. For this reason, an ad hoc group should be created for further consideration.

Seeking for Idle Channels

In the latest 16h working document [1], IBS will listen on multiple frequency and decide the working channel. If there is no free channel, it will negotiate with neighbor to share the same channel. After IBS enters coexistence community, it will maintenance its neighborhood in the current channel until new IBS enters community.

Considering the wireless environment change from time to time, the channels not free in IBS initial stage may be free later, or a channel which is available in the initial stage may be not available because of detection of primary user or overcrowded. So it is perfect if the system in the operating stage listens for the availability of other channels.

The detection and maintenance of available channel may relieve the congestion in the working channel and get more reasonable resource usage.

So a mechanism for detection of idle channel should be designed.

Conclusion

In this contribution, we give some interference transform scenarios which should be considered when BS is in operating stage, including the detection of potential interference, interference relationship release, and idle channel detection. They are not considered in the latest 16h working document [1]. We suggest making an ad hoc group for further consideration about the interference maintenance and management in the operating stage.

Reference

[1] IEEE 802.16h-06/015r1: Air Interface for Fixed Broadband Wireless Access Systems: Amendment for Improved Coexistence Mechanisms for License-Exempt Operation, Working Document