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Title	**A solution/scheme for coexistence of incompatible PHY's in the licensed bands**
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Re:	This is a contribution to IEEE 802.16a.
Abstract	Based on the scheme proposed in C802.16a-02/51 for coexistence of incompatible PHY's in the licensed bands, this contribution provides detailed explanations to the coexistence mechanism as well as suggested changes to 802.16a.
Purpose	Assist 802.16a to enable coexistence of incompatible PHY's in the licensed bands.
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A solution/scheme for coexistence of incompatible PHY's in the licensed bands

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Instruction

In contribution C802.16a-02/51, we proposed an optional mechanism to allow coexistence of incompatible PHY's in the licensed bands. The mechanism is explained in detail as the following.

In the licensed bands between 2-11 GHz, a band in a certain area is normally owned by only one vendor. Because 802.16a has defined three PHY's in the licensed bands, the vendor may not want to limit his choice of subscriber stations for a single PHY and therefore wants to collocate BWA-BS's with different PHY's. However, the PHY's defined in 802.16a are incompatible with each other. As a result, a mechanism is need for the BS's using different PHY's to coexist. A simple and effective way to achieve this goal is to let these BS's to time-share the channel. In other words, the BS's take turns to have control of the channel one after another.

In contribution C802.16a-02/51, such a coexistence mechanism is proposed. Basically, we consider the time domain to be divided into so-called base frames. A base frame has a fixed duration, and comprises of a base DL-subframe followed by a base UL-subframe. The duration of the base D- subframe verses the base UL-subframe is variable. Each base subframe, DL or UL, is further divided among the BWA systems so that each system has control of the channel in a pre-defined portion of the subframe. The division of the subframes should be based on the channel requirements from each BWA system. Figure 1 illustrates a coexistence example for three BWA systems. Obviously, this time-sharing mechanism requires that the BWA systems to be synchronized to a common time reference as well as to the base frame. In addition, lets denote the i'th BWA system as B_i, and its DL and UL subframes as DL_i and UL_i respectively. Then, B_i should be given the following frame parameters:

- BaseFrameDuration: duration of the base frame.
- DLoffset_i: time offset between the base frame start time and the DL_i start time.
- ULoffset_i: time offset between the base frame start time and the UL_i start time.
- DLduration_i: duration of DL_i.
- ULduration_i: duration of UL_i.
- AllocationTime_i: the allocation start time of the above parameters.

Figure 2 illustrates an infrastructure for the above synchronization and BS management. The above parameters are illustrated in Figure 3. Also illustrated in Figure 3 are the DL-MAP and UL-MAP for BWA system B_i. With the use of transmission gaps in the MAPs, we see that no change is needed for the frame structure. Notice that when the above parameters are fixed, the frame duration for BWA system B_i equals to BaseFrameDuration and is also fixed. However, if the above parameters change, the frames before and after allocationTime_i may have different frame durations. A simple method to enable the synchronization of B_i to the base frames is to use two transmission gaps between the end of UL_i and the next DL_i, with the start time of the second transmission be the start time of the next base frame. This is also shown in Figure 3.

In a word, the optional coexistence mechanism allows time-sharing of the channel among collocated BS's using incompatible PHY's. The mechanism does not require any changes to the frame structure in the licensed bands. Naturally, frame parameters should be determined and given to the BS's. Frame synchronization between the BS's is easy to achieve.

Suggested changes

Add the following annex to explain the optional coexistence mechanism.

Annex: Recommended practice for coexistence of incompatible PHY's in the licensed bands

In the licensed bands between 2-11 GHz, a band in a certain area is normally owned by only one vendor. Because 802.16a defined three PHY's for the licensed bands, the vendor may not want to limit his choice of subscriber stations for a single PHY and therefore wants to collocate BWA-BS's with different PHY's. However, the PHY's defined in 802.16a are incompatible with each other. As a result, a mechanism is need for the BS's using different PHY's to coexist. A simple and effective way to achieve this goal is to let these BS's to time-share the channel. In other words, the BS's take turns to have control of the channel one after another.

The time-sharing mechanism is illustrated in Figure 1. Basically, the time domain is divided into so-called base frames. A base frame has a fixed duration, and comprises of a base DL-subframe followed by a base UL-subframe. The duration of the base DL-subframe verses the base UL-subframe is variable. Each base subframe, DL or UL, is further divided among the BWA systems so that each system has control of the channel in a pre-defined portion of the subframe. The division of the subframes should be based on the channel requirements from each BWA system. Obviously, this time-sharing mechanism requires that the BWA systems to be synchronized to a common time reference as well as to the base frames. In addition, lets denote the i'th BWA system as B_i, and its DL and UL subframes as DL_i and UL_i respectively. Then, B_i should be given the following frame parameters:

- BaseFrameDuration: duration of the base frame.
- DLoffset_i: time offset between the base frame start time and the DL_i start time.
- ULoffset_i: time offset between the base frame start time and the UL_i start time.
- DLduration_i: duration of DL_i.
- ULduration_i: duration of UL_i.
- AllocationTime_i: the allocation start time of the above parameters.

Figure 2 illustrates an infrastructure for the above synchronization and BS management. The above parameters are illustrated in Figure 3. Also illustrated in Figure 3 are the DL-MAP and UL-MAP for BWA system B_i. With the use of transmission gaps in the MAPs, we see that no change is needed for the frame structure. Notice that when the above parameters are fixed, the frame duration for BWA system B_i equals to BaseFrameDuration and is also fixed. However, if the above parameters change, the frames before and after allocationTime_i may have different frame durations. A simple method to enable the synchronization of B_i to the base frames is to use two transmission gaps between the end of UL_i and the next DL_i, with the start time of the second transmission be the start time of the next base frame. This is also shown in Figure 3.

In a word, the optional coexistence mechanism allows time-sharing of the channel among collocated BS's using incompatible PHY's. The mechanism does not require any changes to the frame structure in the licensed bands. Naturally, frame parameters should be determined and given to the BS's. Frame synchronization between the BS's is easy to achieve.

Figures

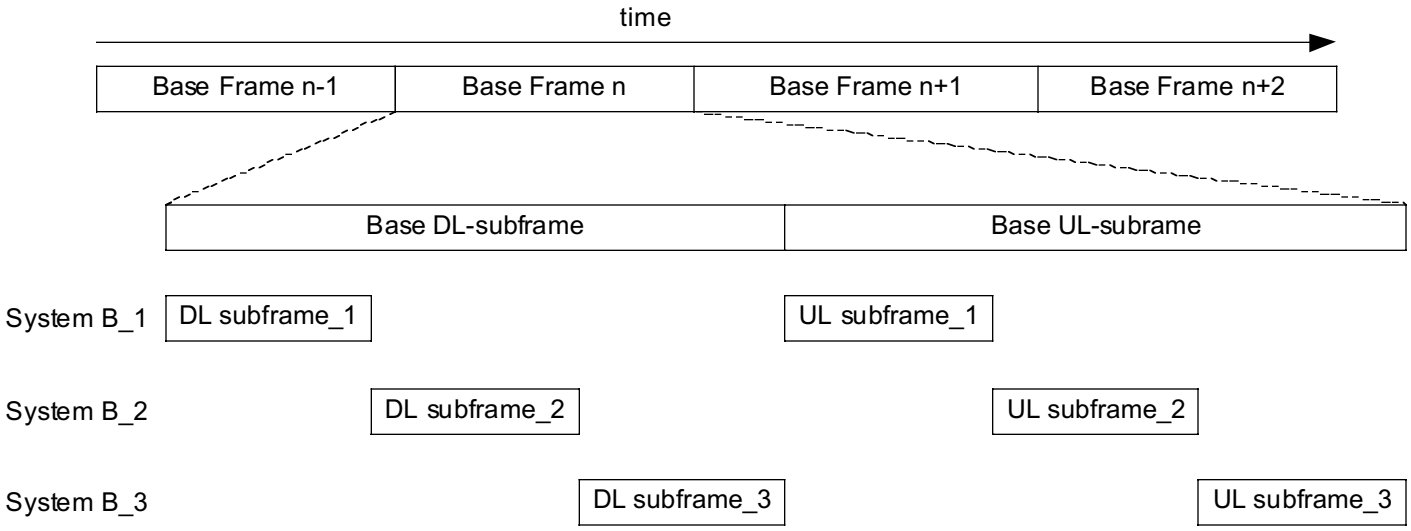

Figure 1--A coexistence example of collocated BS's with incompatible PHY's

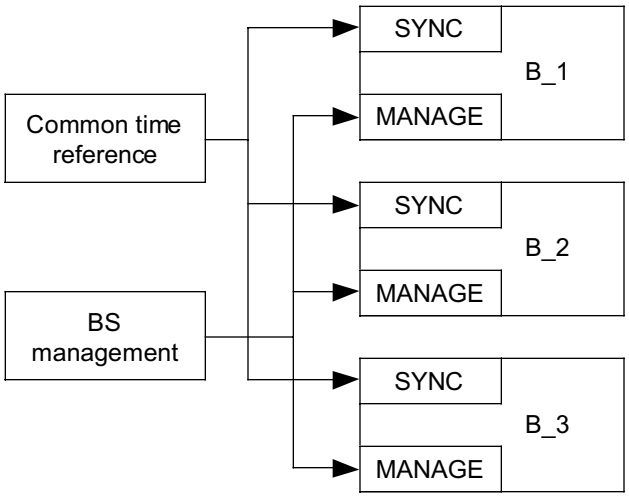

Figure 2—Synchronization and management infrastructure for the optional coexistence mechanism

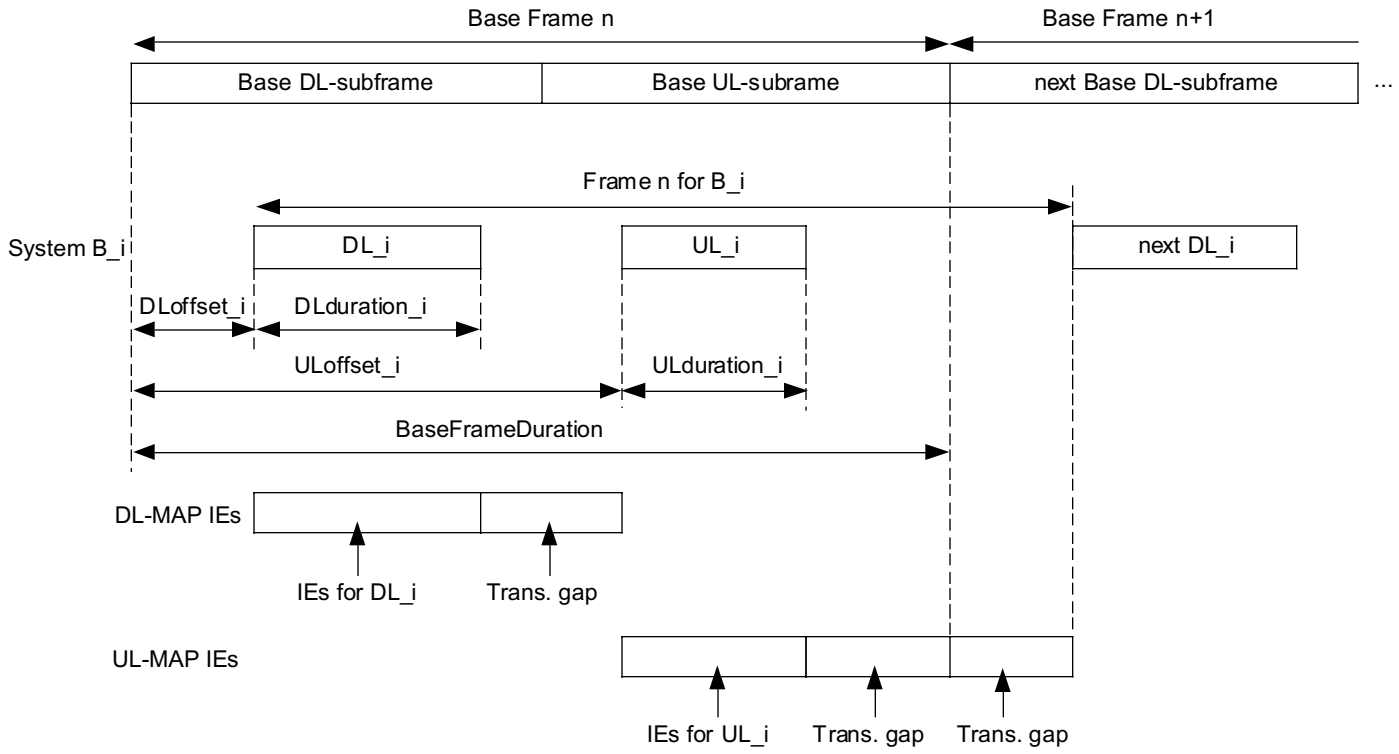

Figure 3—Frame parameters and MAP elements for the optional coexistence mechanism