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Title	**Proposed frame structure for coexistence with 802.11a in the LE bands**
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Re:	This is a contribution to IEEE 802.16a.
Abstract	The contribution proposes a frame structure in the LE bands. The proposed frame has a Silence part to allow 802.11a operation. Channel hand over between BWA and WLAN systems is considered.
Purpose	Assist 802.16a to enable coexistence with 802.11.
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Proposed frame structure for coexistence with 802.11a in the LE bands

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Instruction

The current 802.16a/D3 draft does not satisfactorily address the issue of coexistence with 802.11a in the LE bands. In the case that a 802.16a BWA system partially overlaps 802.11a WLAN service sets, the former ignores the later and claims the whole channel, resulting in the disfunction of the later. However, the two systems can coexist if the BWA system chares with the WLAN system in the time domain. This strategy requires no more than changing the 802.16a frame structure in the LE bands and having a PHY mode compatible with 802.11a.

Proposed frame structure

In comparison with the current frame structure in the LE bands, the proposed frame structure has the following changes:

- A so-called Silence part is added to each frame. BWA transmission is prohibited in this part, enabling WLAN STAs to transmit without interference from the BWA system.
- Each UL-subframe is precluded with a 802.11a compatible header (denoted by NH in the figure below). The Duration/ID information in this header informs all WLAN STAs in the area to wait until the BWA transmission is finished. In addition, optional 802.11a compatible headers can be precluded to the UL-bursts from the BWA subscriber STAs.
- Following the Silence part, two new subframes (for DL and UL respectively) are added. Transmission of these new subframes generates interference to WLAN STAs, triggering their CSMA/CA mechanism and hands over the channel to the BWA system.

The proposed frame structure is illustrated in Figure 1.

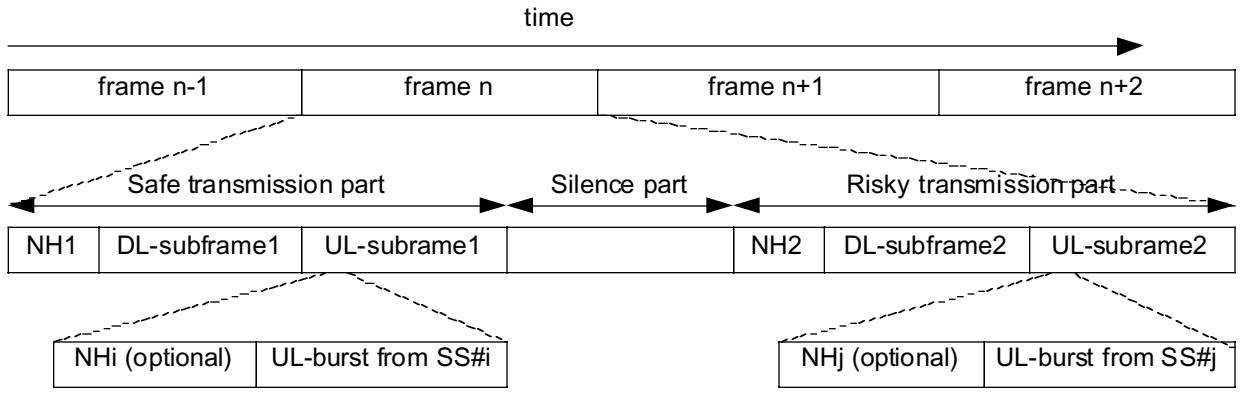

Figure 1 Proposed frame structure in the LE bands

The proposed frame structure consists of three parts: Safe transmission part, Silence part and Risky transmission part. The Safe transmission part consists of DL-subframe1 and UL-subframe1. This part is the same with the current frame except that DL-subrame1 is precluded with a 802.11a compatible header (NH1), and the UL-bursts in UL-subframe1 can be precluded with optional 802.11a compatible headers (NHi's). With correct Duration/ID information, these headers inform all WLAN STAs in the area to update their Network Allocation Vectors and not to transmit until the end of the Safe transmission part. As a result, the BWA transmission in this part is not interfered by WLAN STAs. The Silence part follows the Safe transmission part. The channel is handed over to the WLAN system at the beginning of this part as all WLAN STAs know that they can start the contention for the channel. After the Silence part, the BWA system transmits two subframes (DL-subframe2 and UL-subframe2) in

the Risky transmission part. Similar to the Safe transmission part, these subframes are precluded with 802.11a compatible headers (NH2 and optional NHj's). If there is WLAN transmission going on, part of the two subframes may fail. But the interference they generate will stop the WLAN transmission, handing over the channel to the BWA system. Moreover, if there is no WLAN transmission, the channel is fully used by the BWA transmission. To ensure a strong interference to the WLAN transmission, UL-subframe2 and UL-subframe2 should not have any silent period.

From service point of view, the current 802.16 services are still achievable. Unsolicited Grant Service and Real-Time Polling Service can be carried out in the Safe transmission part. Non-Real-Time Polling Service and Best Effort Service can be carried out using the Risky transmission part, provided that an appropriate ARQ strategy is employed to arrange retransmission of the failed subframes.

To ensure efficient usage of the channel, the length of the Silence part should be adjustable. Specifically, when no WLAN STA exists, the Silence part should have a very short length. This results in periodic gaps in the time domain without any BWA transmission, enabling any possible WLAN STA to show its existence. On the other hand, when there are WLAN STAs existing, the Silence part should have a long enough length to allow proper functioning of the WLAN STAs.