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**IEEE 802.16 Broadband Wireless Access Working Group** <<http://ieee802.org/16>>

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Title                   **On the use of postamble for the relay link**

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Re:                     Response to call for technical contributions on 80216j-06\_027, "Call for Technical Proposals regarding IEEE Project P802.16j", Sep.15,2006

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Abstract              This contribution proposes the use of postamble for the relay link.

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Purpose                 Propose the text regarding the location of amble for the relay link in the multi-hop frame structure.

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# On the use of postamble for relay link

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## 1. Introduction

Figure 1 shows a typical topology that arises in the case of multi-hop relay. To support multi-hop relay, a minimum configuration of the frame structure has been agreed in the task group [1]. The group also agreed that the frame start preamble shall be time aligned throughout the system [2]. Figure 2 shows the minimum configuration of frame structure along with the time aligned preamble as agreed during the November meeting.

In addition to the frame start preamble defined for the access link, an amble is also needed for the relay link in order to enable synchronization as well as to facilitate measurement on the relay link. Furthermore, it is proposed that the amble on the relay link should also be time aligned throughout the network in order to obtain the same benefits as those obtained by the time aligned preamble. For an amble that is time aligned throughout the system in the relay zone, 3 possible cases can arise:

Case 1. Placing the amble at the start of the relay zone.

Case 2. Placing the amble at the end of the relay zone.

Case 3. Placing the amble somewhere in the middle of the relay zone.

Each case is analyzed to assess the benefit in section 2. From the analysis in section 2, it is concluded that the use of postamble is the best among the 3 cases mentioned above. Hence, this contribution proposes the use of postamble for the relay link.

## 2. Analysis of amble location

### 2.1 Case 1: Amble at the start of the relay zone

Figure 3 shows an example of a frame structure wherein the amble is placed at the start of the relay zone and at the end of the relay zone. By noting that each MMR-cell may have a different traffic ratio for the access link and the relay link, we argue that it is beneficial to accommodate flexible ratio of the access zone and the relay zone. However, we can see from Figure 3 that by placing the time aligned amble at the start of the relay zone, we are forced to give up the flexibility in choosing the access zone to relay zone ratio. Therefore, we conclude

that while time aligned amble can be placed at the start of the relay zone, this option results in a loss of flexibility.

### 2.2 Case 2: Amble at the end of the relay zone

By placing the amble at the end of the relay zone, however, as in the Figures 3, flexibility is achieved in addition to maintaining the time aligned attribute. Note that the ratio of DL/UL subframe is identical throughout the system. Figure 4 shows the example of the multi-hop frame structure with postamble, i.e. in Figure 4, the amble is placed at the end of each relay zone.

### 2.3 Case 3: Amble in the middle of the relay zone

Consider the case when the amble is placed somewhere in the middle of the relay zone, while satisfying the time aligned amble location. In this case, as shown in Figure 5, the amble location is likely to constrain the resource allocation.

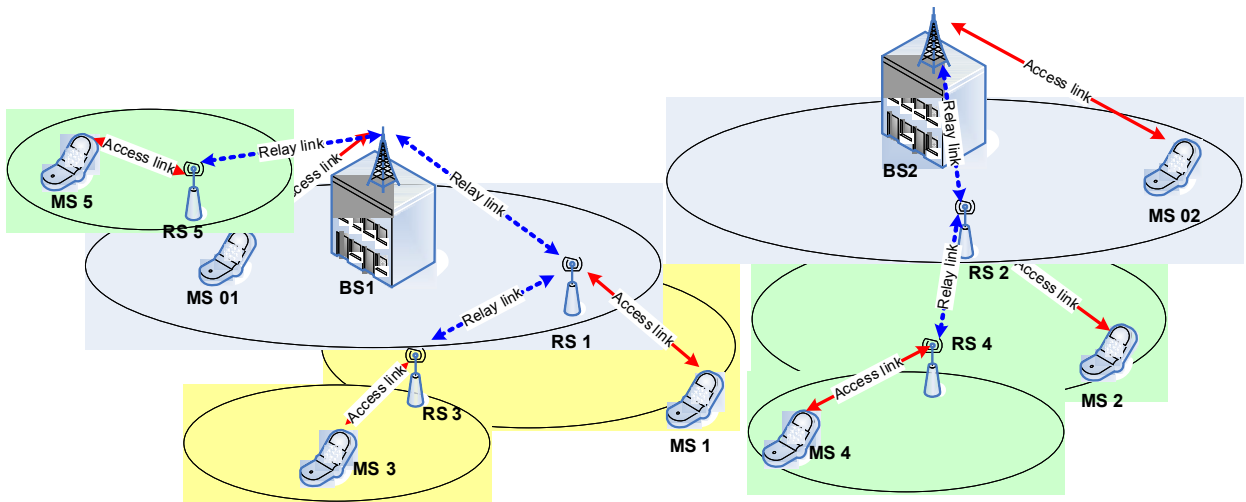


Figure 1. An example topology using Multi-hop Relay

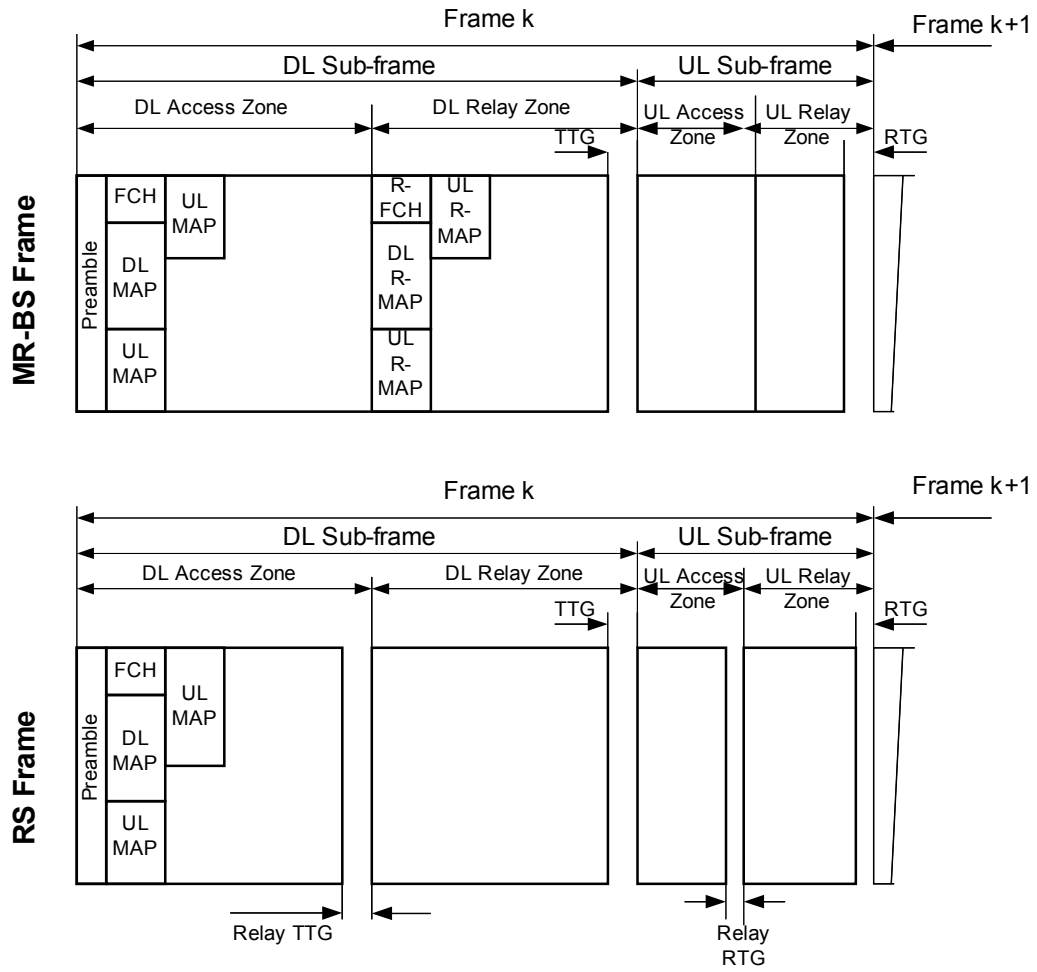


Figure 2. An example of a frame structure supporting multi-hop relay (adopted from [1]).

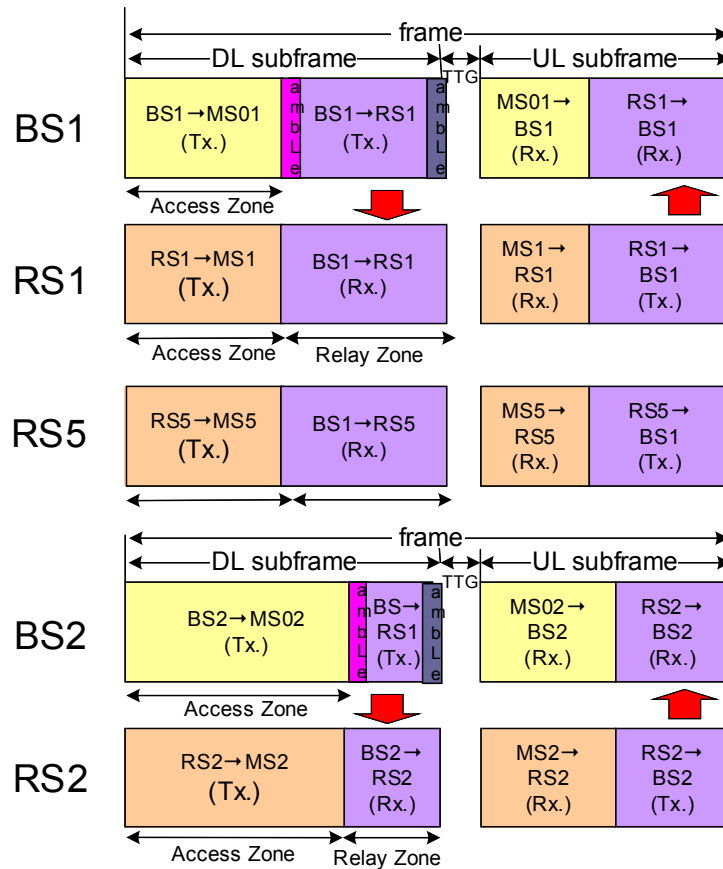


Figure 3. Postamble vs. Preamble. Using the postamble it is possible to maintain time alignment while allowing flexibility in the zone boundary. When ample is located at the start of the frame, however (i.e. preamble), time alignment attribute is lost when choosing for zone boundary flexibility.

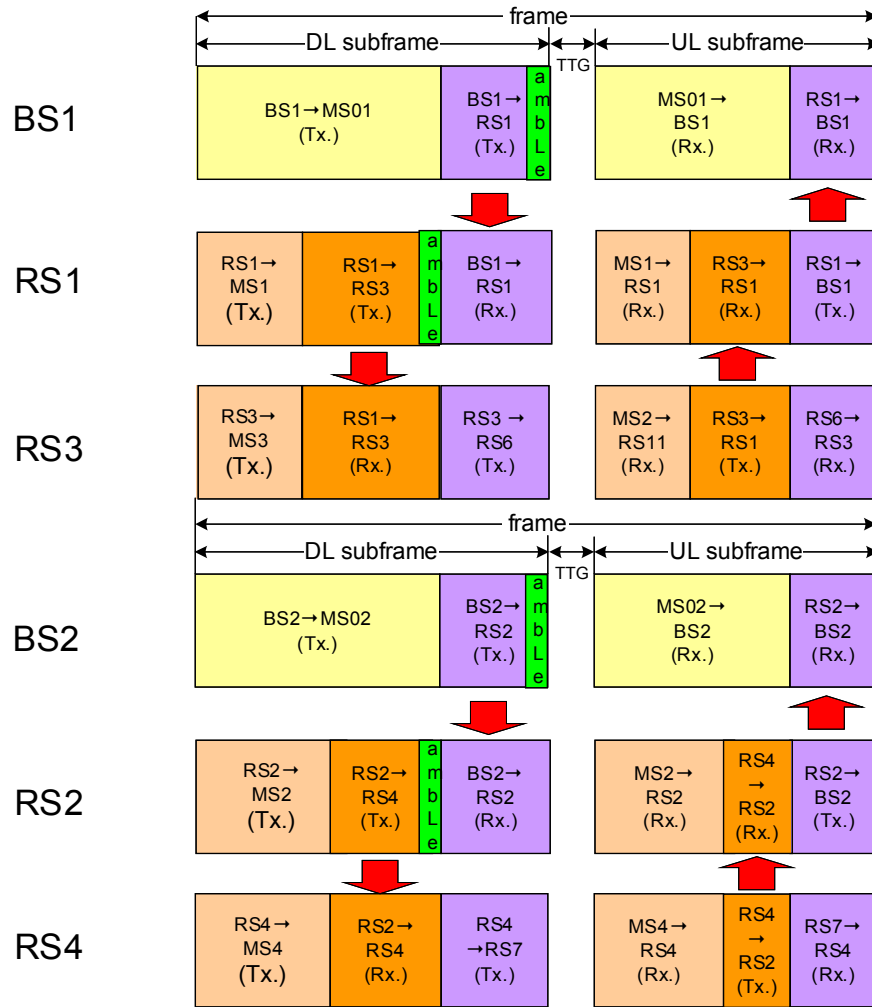


Figure 4 Time aligned amble location at the end of each relay zone for multi-hop relay.

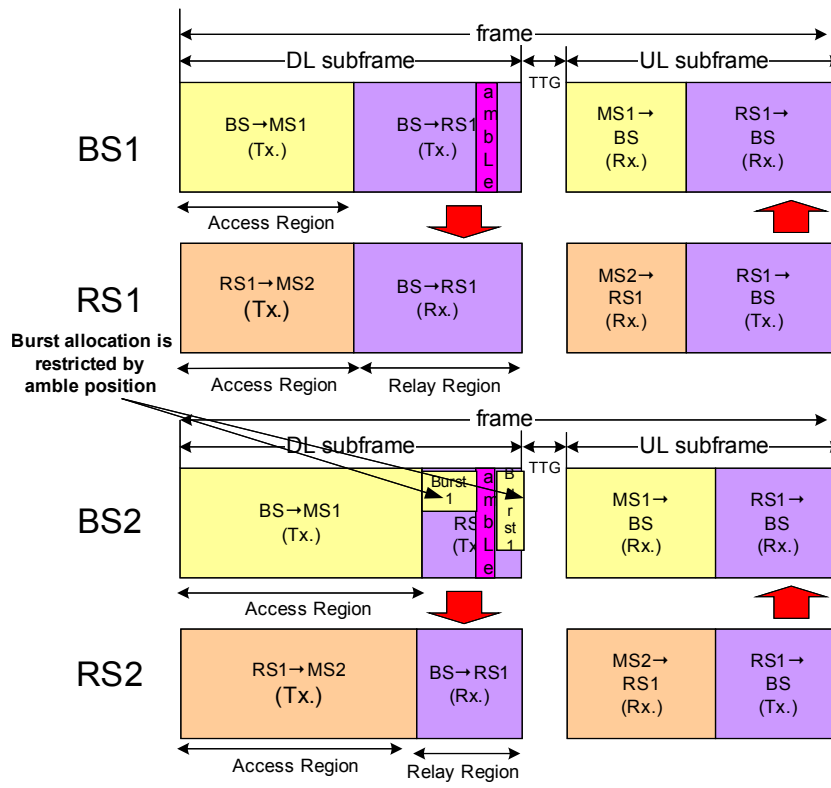


Figure 5 Time aligned ambler location in the middle of the relay zone

### 5. Proposed Text

+++++++ start text proposal ++++++

[Insert a new sentence at the end of subclause 8.4.4.7.2.2:]

The relay link amble, when present, shall be located at the end of the last DL relay zone in which MR-BS/RS is in transmit mode.

[Replace the Figure xx at subclause 8.4.4.7.2.1:]

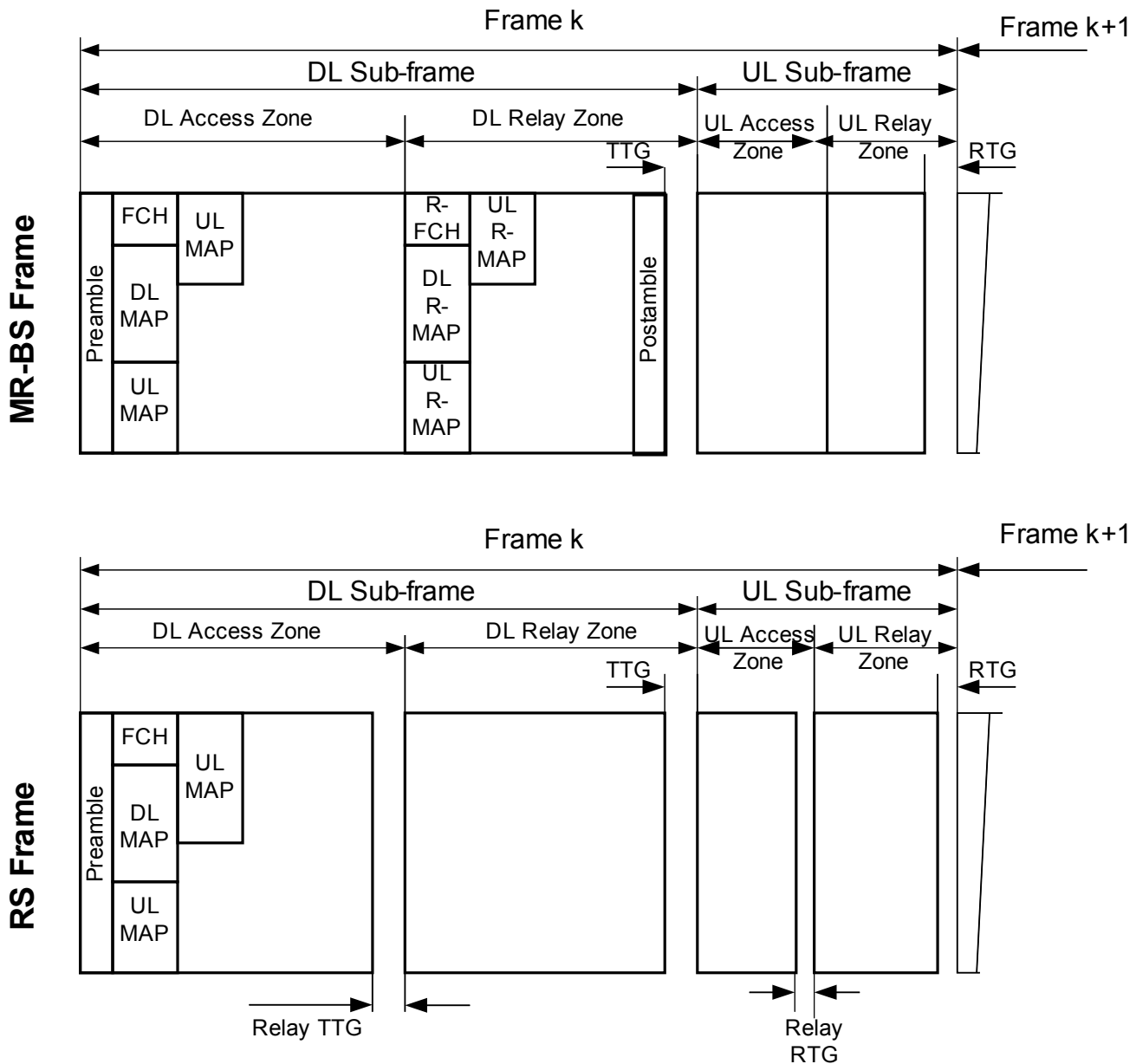


Figure xx Example of minimum configuration for an in-band non-transparent frame structure

+++++++ End of text proposal ++++++



## References

- [1] IEEE 802.16j-06/298r2, "Minimum guideline for harmonized frame structure", Nov. 2006
- [2] IEEE 802.16j-06/233r8, "Frame Structure to support relay node operation", Nov. 2006