Project	**IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>**
Title	IEEE 802.16m Relay Frame Structure
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Re:	Frame structure proposals for relay support
Abstract	This contribution proposes the 16m frame structure based on IEEE 802.16m-08/118r4.
Purpose	Text proposal for 802.16m relay frame structure
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IEEE 802.16m Relay Frame Structure

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Institute for Information Industry

Introduction

The text for 16j RS support that was agreed in the March meeting is as follows:

A 16m BS that is capable of supporting a 16j RS, shall communicate with the 16j RS in the "legacy zone". The 16m BS is not required to provide 16j protocol support in the "16m zone". The design of 16m relay protocols should be based on the design of 16j wherever possible, although 16m relay protocols used in the "16m zone" may be different from 16j protocols used in the "legacy zone".

This contribution proposes a 802.16m relay frame structure supporting both 16m and 16j RSs, and optionally provides legacy support at the 16m RS. The proposed frame structures are based on the basic frame structure with legacy support in figure 11-4.3 of C802.16m-08/118r4.

Proposed Frame Structure:

For the flexibility to accommodate new features, 16m and legacy system use distinct preambles which are transmitted separately by a predefined symbol offset. The 16m and legacy systems are multiplexed across time domain and the switching point between the 16m and legacy zones should be at the boundary of a subframe. In order to enable relay operations, additional relay zone and access zone are introduced within the DL/UL 16m and legacy zones for communicating with 16j/m RSs as well as communicating with legacy and 16m MSs. The separation of relay zones and access zones within the 16m or legacy zones is at the boundary of a symbol and adaptive to the dynamic traffic in relay link and access link. Additionally, the DL/UL switching of the relay must follow the DL/UL switching of the subframes. The specific descriptions of the zones are as follows:

- DL Legacy Access Zone (DLAZ): A portion of the DL legacy zone which is used for 16m BS/16j RS/16m RS to 16e MS transmission. The DLAZ may consist of the entire DL legacy zone, depending on the method used to separate the transmissions on the DL access and DL relay links in legacy zones. This zone begins with a preamble followed by an FCH and the DL MAP and possibly UL MAP. This zone may be accessed by 16m RS.
- UL Legacy Access Zone (ULAZ): A portion of the UL legacy zone which is used for 16e MS to BS/16j RS/16m RS transmission. A UL legacy zone may have no ULAZ, or the ULAZ may consist of the entire legacy uplink zone, depending on the method used to separate the transmissions on the access and relay links. This zone may be accessed by 16m RS.
- DL Legacy Relay Zone (DLRZ): A portion of the DL legacy zone which is used for 16m BS to 16j RS/16m RS transmission. A DL legacy zone may have no DLRZ, or the DLRZ may consist of the entire DL legacy zone, depending on the method used to separate the transmissions on the access and relay links. This zone begins with an R-FCH and the R-MAP. This zone may be accessed by 16m RS.
- UL Legacy Relay Zone (ULRZ): A portion of the UL legacy zone which is used for 16j RS/16m RS to BS transmission. A UL legacy zone may have no ULRZ, or the ULRZ may consist of the legacy uplink sub-frame, depending on the method used to separate the transmissions on the access and relay links. This zone may be accessed by 16m RS.

- DL 16m Access Zone (DmAZ): A portion of the DL 16m zone which is used for BS/16m RS to 16m MS transmission. This zone begins with a new 16m frame header information.
- UL 16m Access Zone (UmAZ): A portion of the UL 16m zone which is used for 16m MS to BS/16m RS transmission.
- DL 16m Relay Zone (DmRZ): A portion of the DL 16m zone which is used for 16m BS to 16m RS transmission. This zone may begin with a relay zone header information.
- UL 16m Relay Zone (UmRZ): A portion of the UL 16m zone which is used for 16m RS to 16m BS transmission.

There are three configuration options in the "legacy zone" for the 16m RS.

Option 1:

A 16m RS does not support the legacy MS but only supports the 16m MS in the 16m zone. Figure 1 shows an example of the configuration for option 1. The number of transition switching gaps for the 16m RS is 2.

Option 2:

A 16m RS supports the 16m MS in the 16m zone and supports the legacy MS in the legacy zone. The 16m RS does not share resources with the 16j RS in the DL/UL legacy relay zones. Figure 2 shows an example of the configuration for option 2. The number of transition switching gaps for the 16m RS is 2.

Option 3:

A 16m RS supports the 16m MS in the 16m zones and supports the legacy MS in the legacy zones. The 16m RS shares resources with the 16j RS in the DL/UL legacy relay zones. Figure 3 shows an example of the configuration for option 3.

Note that the order of the DL 16m relay zone and the DL 16m access zone and the order of the UL 16m relay zone and the UL 16m access zone could be swapped to reduce the number of transition switching gaps of the 16m RS from 6 to 4 for option 3 when there is no 16m preamble at the beginning of the 16m frame. In addition, swapping the order of the DL 16m relay zone and the DL 16m access zone facilitates DL in-frame relay for all options.

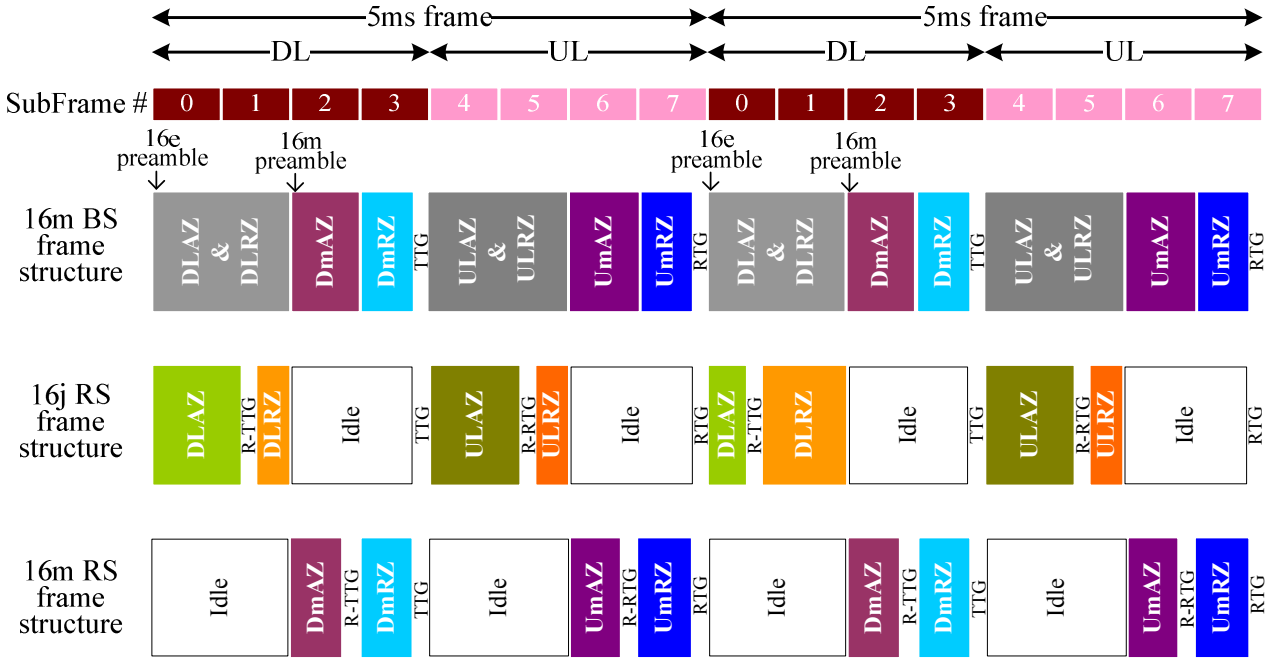

Figure 1 An example of option 1 configuration

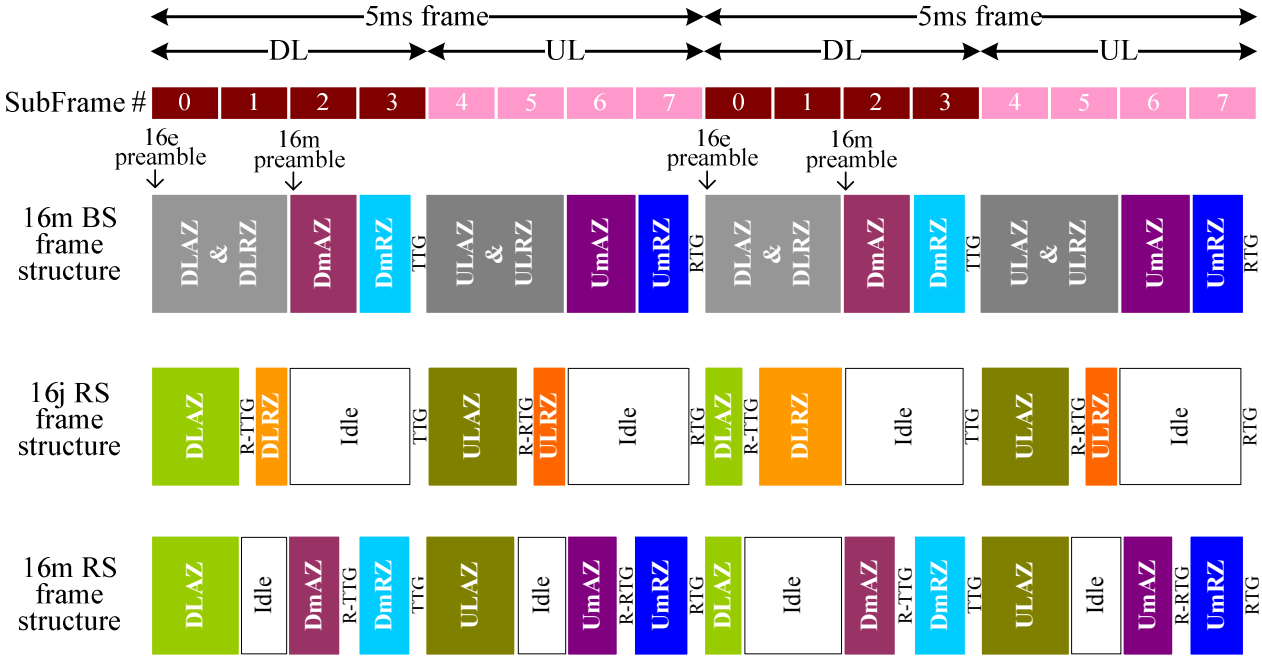

Figure 2 An example of option 2 configuration

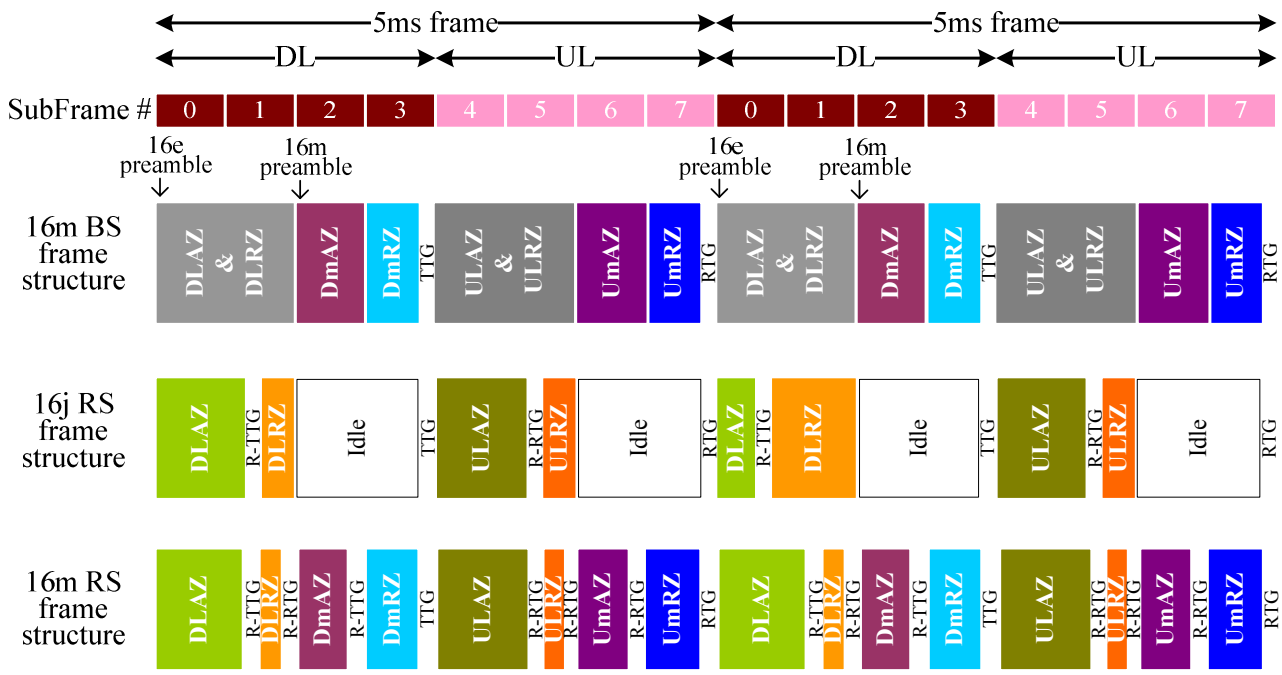

Figure 3 An example of option 3 configuration

Proposed Text for SDD

[Insert the following text in the section 11.4.4 “Relay Support in Frame Structure”]

16m and legacy system use distinct preambles which are transmitted separately by a predefined symbol offset. The 16m and legacy systems are multiplexed across time domain and the switching point between the 16m and legacy zones should be at the boundary of a subframe. In order to enable relay operations, additional relay zone and access zone are introduced within the DL/UL 16m and legacy zones for communicating with 16j/m RSs as well as communicating with legacy and 16m MSs. The separation of relay zones and access zones within the 16m or legacy zones is at the boundary of a symbol and adaptive to the dynamic traffic in relay link and access link. Additionally, the DL/UL switching of the relay must follow the DL/UL switching of the subframes. The specific descriptions of the zones are as follows:

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- DL Legacy Relay Zone (DLRZ): A portion of the DL legacy zone which is used for 16m BS to 16j RS/16m

RS transmission. A DL legacy zone may have no DLRZ, or the DLRZ may consist of the entire DL legacy zone, depending on the method used to separate the transmissions on the access and relay links. This zone begins with an R-FCH and the R-MAP. This zone may be accessed by 16m RS.

- UL Legacy Relay Zone (ULRZ): A portion of the UL legacy zone which is used for 16j RS/16m RS to BS transmission. A UL legacy zone may have no ULRZ, or the ULRZ may consist of the legacy uplink sub-frame, depending on the method used to separate the transmissions on the access and relay links. This zone may be accessed by 16m RS.
- DL 16m Access Zone (DmAZ): A portion of the DL 16m zone which is used for BS/16m RS to 16m MS transmission. This zone begins with a new 16m frame header information.
- UL 16m Access Zone (UmAZ): A portion of the UL 16m zone which is used for 16m MS to BS/16m RS transmission.
- DL 16m Relay Zone (DmRZ): A portion of the DL 16m zone which is used for 16m BS to 16m RS transmission. This zone may begin with a relay zone header information.
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Option 2:

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Option 3:

A 16m RS supports the 16m MS in the 16m zones and supports the legacy MS in the legacy zones. The 16m RS shares resources with the 16j RS in the DL/UL legacy relay zones. Figure 3 shows an example of the configuration for option 3.

Note that the order of the DL 16m relay zone and the DL 16m access zone and the order of the UL 16m relay zone and the UL 16m access zone could be swapped to reduce the number of transition switching gaps of the 16m RS from 6 to 4 for option 3. In addition, swapping the order of the DL 16m relay zone and the DL 16m access zone facilitates DL in-frame relay for all options.

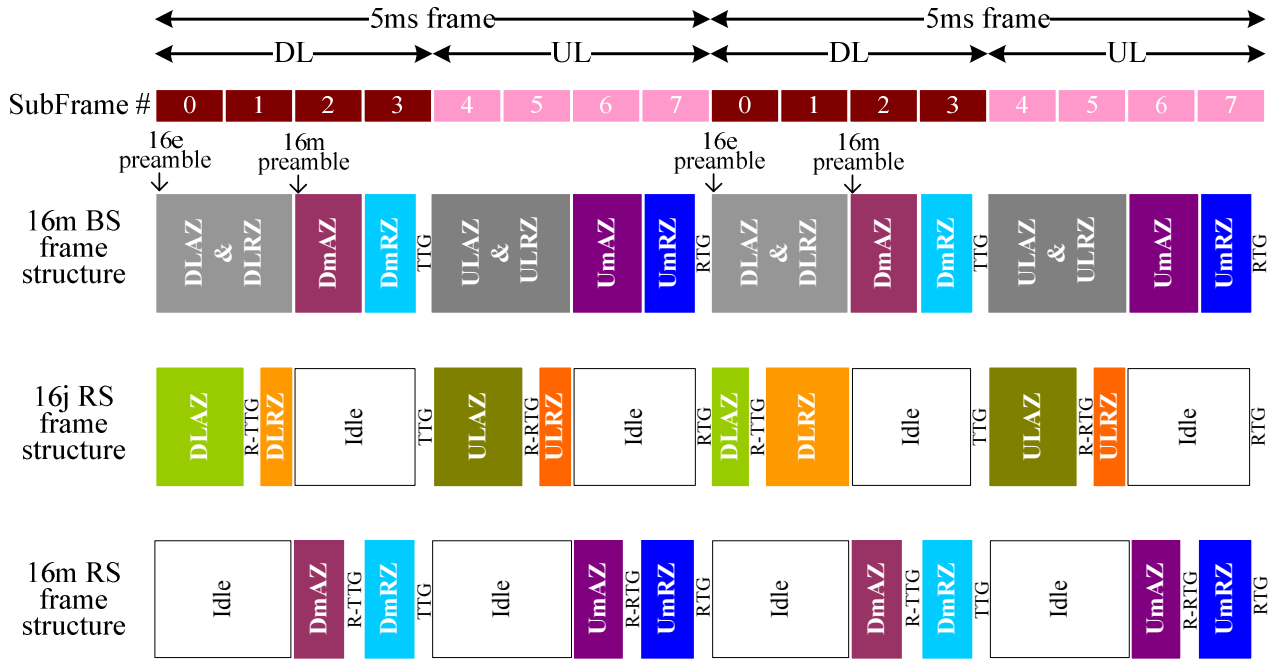

Figure 1 An example of option 1 configuration

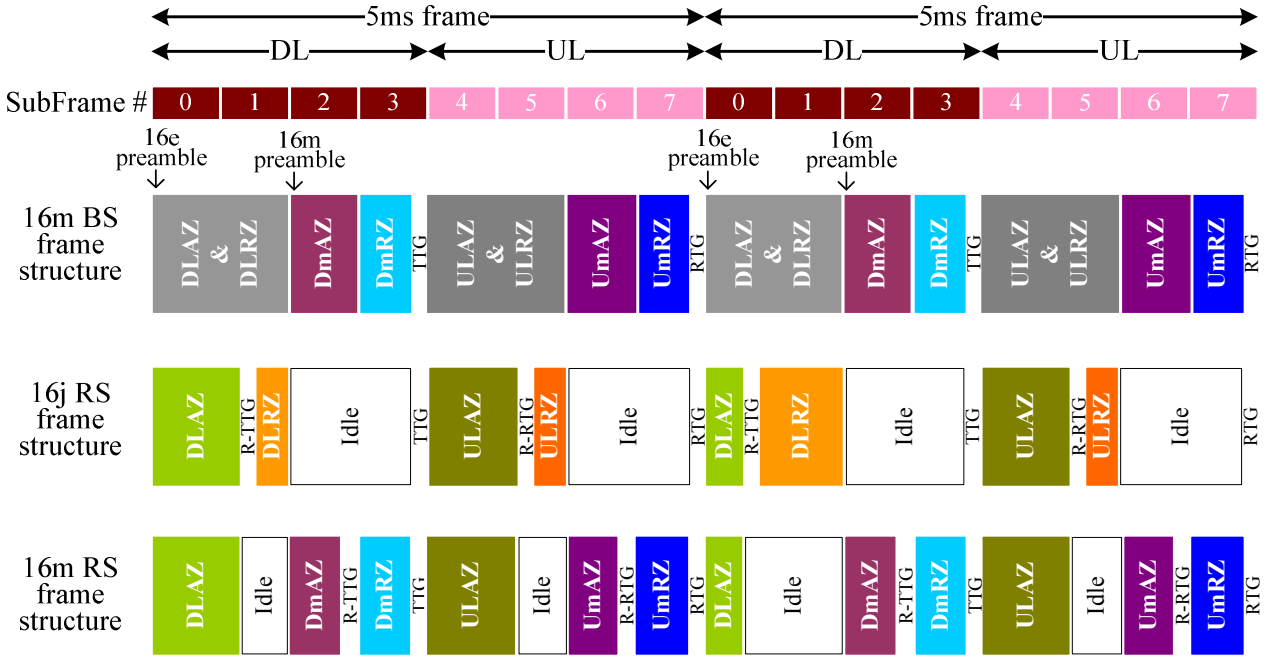

Figure 2 An example of option 2 configuration

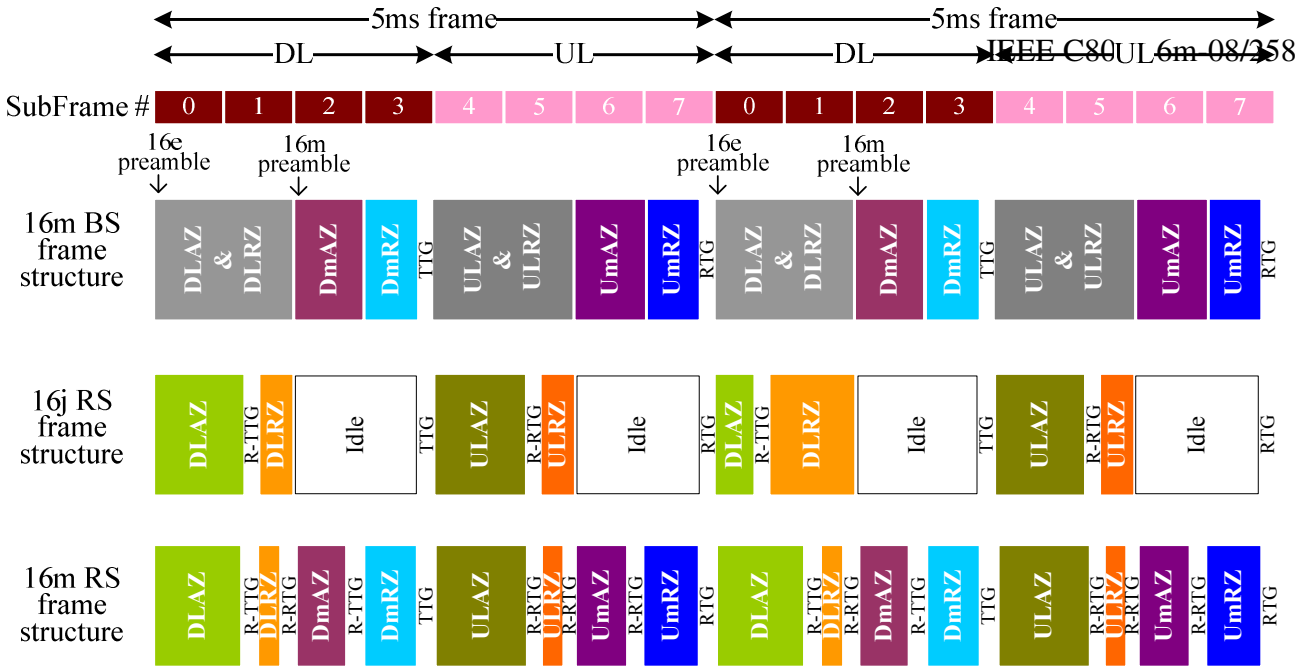

Figure 3 An example of option 3 configuration