

| | | |
|------------------------------|--|--|
| Project | IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 > | |
| Title | Direct Relaying Zone in Transparent RS system | |
| Date Submitted | 2007-4-20 | |
| Source(s) | <p>Su Chang Chae, Young-il Kim, Hyunjae Kim ETRI</p> <p>Junichi Suga Fujitsu Laboratories Ltd. Kamikodanaka 4-1-1, Kawasaki, 211-8588, Japan</p> <p>Makoto Yoshida, Michiharu Nakamura Fujitsu Laboratories LTD. 5-5, Hikarinooka Yokosuka, Japan. 239-0847</p> <p>Kyu Ha Lee, Changyun Kim, Yong Wook Lee Samsung Thales</p> | <p>schae@etri.re.kr</p> <p>Voice: +81 44 754 2811 Fax: +81 44 754 2786 suga.junichi@jp.fujitsu.com</p> <p>Voice: +81-46-839-5371 Fax: +81-46-839-5560 mako@labs.fujitsu.com michi@labs.fujitsu.com</p> <p>kyuha.lee@samsung.com</p> |
| Re: | This contribution is response to call for technical proposal (IEEE 802.16j-06/027) | |
| Abstract | This contribution proposes combined A&F and D&F relaying. | |
| Purpose | For discussion and approval of inclusion of the proposed text into the P802.16j baseline document. | |
| Notice | This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. | |
| Release | The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16. | |
| Patent Policy and Procedures | The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures < http://ieee802.org/16/ipr/patents/policy.html >, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft | |

publication will be approved for publication. Please notify the Chair <<mailto:chair@wirelessman.org>> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <<http://ieee802.org/16/ipr/patents/notices>>.

Direct Relaying Zone in Transparent RS system

Introduction

There are three relaying method as follows,

- A&F (Amplify and Forward)
- M&F (Modulation and Forward)
- D&F (Decode and Forward)

Since A&F method is relaying data from sender to receiver in time domain (i.e. without FFT, demodulation and FEC decoding), RS can relay data with minimum delay by using A&F method. However Burst Profile for A&F relaying may be dominated by the radio link that has the worst condition between relay link and access link.

M&F method is relaying data without decoding and re-encoding. RS which receives data from sender demodulates and modulates it, and relays regenerated data to receiver. Though some gaps are needed for RS to demodulate and modulate, RS can relay data within one frame by using M&F method.

Decode and forward is the most robust, hence higher modulation schemes can be used, because the Burst Profile on relay link and the Burst Profile on access link can be set individually. However it takes time to decode and re-encode data at RS, RS takes a few frames to relay data from sender to receiver.

This contribution proposes the direct relaying zone on which RS relays data from sender to receiver within one frame by using A&F method or M&F method. Since RS does not decode data on this zone, MR-BS should notify the zone information to RS and control the transmission on this zone.

Direct Relaying Zone

In Figure 1, two direct relaying zones are defined in each subframe. First direct relaying zone in DL subframe is the zone where RS should receive data from MR-BS, and second direct relaying zone in DL subframe is the zone where RS should forward signal or data to MS under RS. The direct relaying zone in UL subframe is also similar.

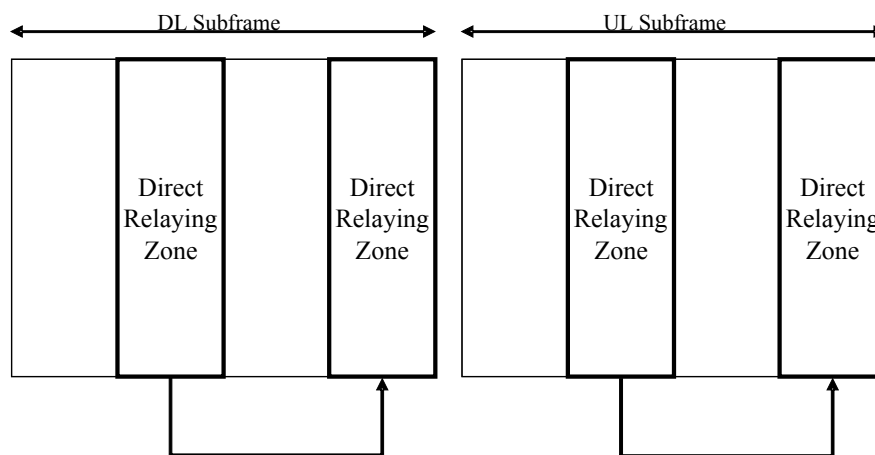


Figure 1 Direct Relaying Zone

RS receives data from sender on the direct relaying zone in receiving area, and forwards it to receiver on the direct relaying zone in sending area by using A&F method or M&F method.

IE for Direct Relaying Zone

MR-BS decides the direct relaying zone and relaying method on this zone which is A&F method or M&F method, and notifies this information about the zone to RS by DL/UL MAP including a value of frame offset. RS starts to relay at frame defined by this value. The value of frame offset is defined considering of the decoding delay of DL/UL MAP at RS. And the other parameters that MR-BS notifies RS about the direct relaying zone are the following and Figure 2 shows the relation these parameters and the frame.

a) Symbol offset for direct relaying zone

The OFDMA symbol offset in which direct relaying zone starts

b) No. OFDMA symbols for RS receiving

The number of OFDMA symbols which RS should receive for direct relaying

c) No. OFDMA symbols of gap

The number of OFDMA symbols between the receiving area and the forwarding area

d) No. OFDMA symbols for RS relaying

The number of OFDMA symbols by which RS should relay signal without decoding and re-encoding

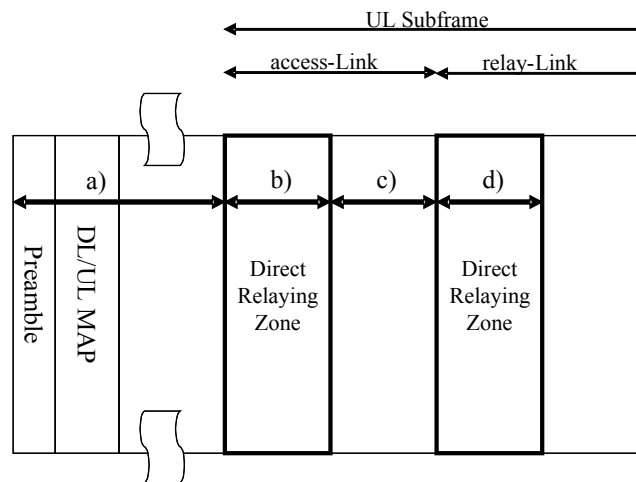


Figure 2 IE of Direct Relaying Zone

RS which receives these parameters relays signal from sender to receiver without decoding and re-encoding on the zone indicated by these parameters.

Specific text changes

[Change Table 277c as indicated.]

Table 277c—Extended-2 DIUC code assignment for DIUC=14

| Extended-2 DIUC (hexadecimal) | Usage |
|----------------------------------|--|
| 00 | MBS_MAP_IE |
| 01 | HO_Anchor_Active_DL_MAP_IE |
| 02 | HO_Active_Anchor_DL_MAP_IE |
| 03 | HO_CID_Translation_MAP_IE |
| 04 | MIMO_in_another_BS_IE |
| 05 | Macro-MIMO_DL_Basic_IE |
| 06 | Skip_IE |
| 07 | HARQ_DL_MAP_IE |
| 08 | HARQ_ACK_IE |
| 09 | Enhanced_DL_MAP_IE |
| 0A | Closed-loop MIMO DL Enhanced IE |
| 0B | RS-RNG_RSP_ALLOC_IE |
| 0BC | Direct Relaying DL Zone IE |
| 0B-0D | <i>Reserved</i> |
| 0E | AAS_SDMA_DL_IE |
| 0F | <i>Reserved</i> |

Insert a new subclause 8.4.5.3.28

[8.4.5.3.28 Direct Relaying DL Zone IE format](#)

[This IE is sent by MS-BS to RS to notify the zone of downlink for relaying within one frame without decoding and re-encoding. If this IE indicates A&F method for relaying, RS should relay signal from MR-BS without FFT, demodulation and FEC decoding on the zone indicated by this IE. If this IE indicates M&F method for relaying, RS should relay signal from MR-BS with FFT, demodulation, modulation and IFFT.](#)

[Table 286za - Direct Relaying DL Zone IE](#)

| Syntax | Size | Notes |
|------------------------|----------------------|-----------------------|
|------------------------|----------------------|-----------------------|

| | | |
|---|---------------|-------------------------------|
| <u>Direct Relaying DL Zone IE() {</u> | | |
| <u>Extended-2 UIUC=</u> | <u>4 bits</u> | <u>0x0B</u> |
| <u>Length</u> | <u>8 bits</u> | |
| <u>Relaying Method Type</u> | <u>1 bit</u> | <u>0: A&F, 1: M&F</u> |
| <u>Symbol offset for RS receiving</u> | <u>6 bits</u> | |
| <u>No. OFDMA symbols for RS receiving</u> | <u>4 bits</u> | |
| <u>No. OFDMA symbols of gap</u> | <u>4 bits</u> | |
| <u>No. OFDMA symbols for RS relaying</u> | <u>4 bits</u> | |
| <u>Frame offset</u> | <u>2 bits</u> | |

Relaying Method Type

Indicates the relaying method which is A&F or M&F

Symbol offset for direct relaying zone

The OFDMA symbol offset in which direct relaying zone starts

No. OFDMA symbols for RS receiving

The number of OFDMA symbols which RS should receive for relaying without decoding and encoding

No. OFDMA symbols of gap

The number of OFDMA symbols between the receiving area and the forwarding area

No. OFDMA symbols for RS relaying

The number of OFDMA symbols by which RS should relay signal without decoding and encoding

Frame offset

Frame offset from the current frame. RS starts relaying indicated by this IE at frame defined this value.

[Change Table 290a as indicated.]

Table 290a—Extended UIUC Code Assignment for UIUC=15

| Extended UIUC (hexadecimal) | Usage |
|--|--|
| 00 | Power_control_IE |
| 01 | Mini-subchannel_allocation_IE |
| 02 | AAS_UL_IE |
| 03 | CQICH_Alloc_IE |
| 04 | UL Zone IE |
| 05 | PHYMOD_UL_IE |
| 06 | MIMO_UL_Basic_IE |
| 07 | UL-MAP_Fast_Tracking_IE |
| 08 | UL_PUSC_Burst_Allocation_in_Other_Segment_IE |
| 09 | Fast_Ranging_IE |
| 0A | UL Allocation Start IE |

| | |
|---------|--|
| | |
| 0B...0F | Reserved Direct Relaying Zone UL IE |
| 0C...0F | Reserved |

Insert a new subclause 8.4.5.4.29

8.4.5.4.29 Direct Relaying Zone UL IE format

This IE is sent by MS-BS to RS to notify the zone of uplink for relaying within one frame. If this IE indicates A&F method for relaying, RS should relay signal from MR-BS without FFT, demodulation and FEC decoding on the zone indicated by this IE. If this IE indicates M&F method for relaying, RS should relay signal from MR-BS with FFT, demodulation, modulation and IFFT.

Table 302w - Direct Relaying UL Zone IE

| <u>Syntax</u> | <u>Size</u> | <u>Notes</u> |
|---|---------------|-------------------------------|
| <u>Direct Relaying UL Zone IE() {</u> | | |
| <u>Extended UIUC=</u> | <u>4 bits</u> | <u>0x0B</u> |
| <u>Length</u> | <u>8 bits</u> | |
| <u>Relaying Method Type</u> | <u>1 bit</u> | <u>0: A&F, 1: M&F</u> |
| <u>Symbol offset for direct relaying zone</u> | <u>6 bits</u> | |
| <u>No. OFDMA symbols for RS receiving</u> | <u>4 bits</u> | |
| <u>No. OFDMA symbols of gap</u> | <u>4 bits</u> | |
| <u>No. OFDMA symbols for RS relaying</u> | <u>4 bits</u> | |
| <u>Frame offset</u> | <u>2 bits</u> | |

Relaying Method Type

Indicates the relaying method which is A&F or M&F

Symbol offset for direct relaying zone

The OFDMA symbol offset in which direct relaying zone starts

No. OFDMA symbols for RS receiving

The number of OFDMA symbols which RS should receive for relaying without decoding and encoding

No. OFDMA symbols of gap

The number of OFDMA symbols between the receiving area and the forwarding area

No. OFDMA symbols for RS forwarding

The number of OFDMA symbols by which RS should forward signal without decoding and encoding

Frame offset

Frame offset from the current frame. RS starts relaying indicated by this IE at frame defined this value.

References

- C802 16j-06_127, "A Proposal for combined A&F and D&F relaying"
- C802 16j-06_250, "Hybrid Relay Structure with a Single Frame"

