

Proposed Frame Structure and Relay Region Indicator

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Purpose:

The purpose of this slide is to support proposed frame structure and relay region indicator.

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Proposed Frame Structure and Relay Region Indicator:

#06/256, #06/257, #06/258, #06/260, #06/263

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Outline

- Introduction
- Frame Structure for 2-hop relay
- Frame Structure for Multi-hop relay
- Frame Structure for out of band relay
- Initial relay region indicator
- Flexible relay region
- Summary

Introduction

- The frame structure for 2-hop and multi-hop relay are:
 - Simple extension of 802.16e frame structure
 - Minimize the number of transition gap
 - Dynamic change of access/relay region
 - Support various Resource Allocation
 - Support Mobile RS handover
 - Easy extension to multi-hop relay
- The frame structure for out of band
 - Reuse of .16e frame
- Initial Relay Region indicator
 - STC_DL_ZONE_IE
- Flexibility of Relay Region
 - R-FCH

Terminology

MMR-BS Frame: Frame structure for transmission/reception by BS

RS-Frame: Frame structure for transmission/reception by RS

Access Region: This is the region in the DL/UL subframe of the MMR-BS frame and RS frame for communicating to/from MS

Relay Region: This is the region in the DL/UL subframe of the MMR-BS frame and RS frame for communicating between BS and RS, RS and RS.

RSTG: Relay Subframe Time Gap

RFTG: Relay Frame Time Gap

R-TTG: Relay-TTG

R-RTG: Relay-RTG

R-FCH: Relay-FCH

R-DL-MAP: A MAC message that defines burst start times for both time division multiplexing and time division multiple access (TDMA) by a relay station on the downlink

R-UL-MAP: A set of information that defines the entire access for a scheduling interval for a relay link

Odd-hop RS: When the number of hop between MMR-BS and RS is odd, then RS is called odd-hop RS

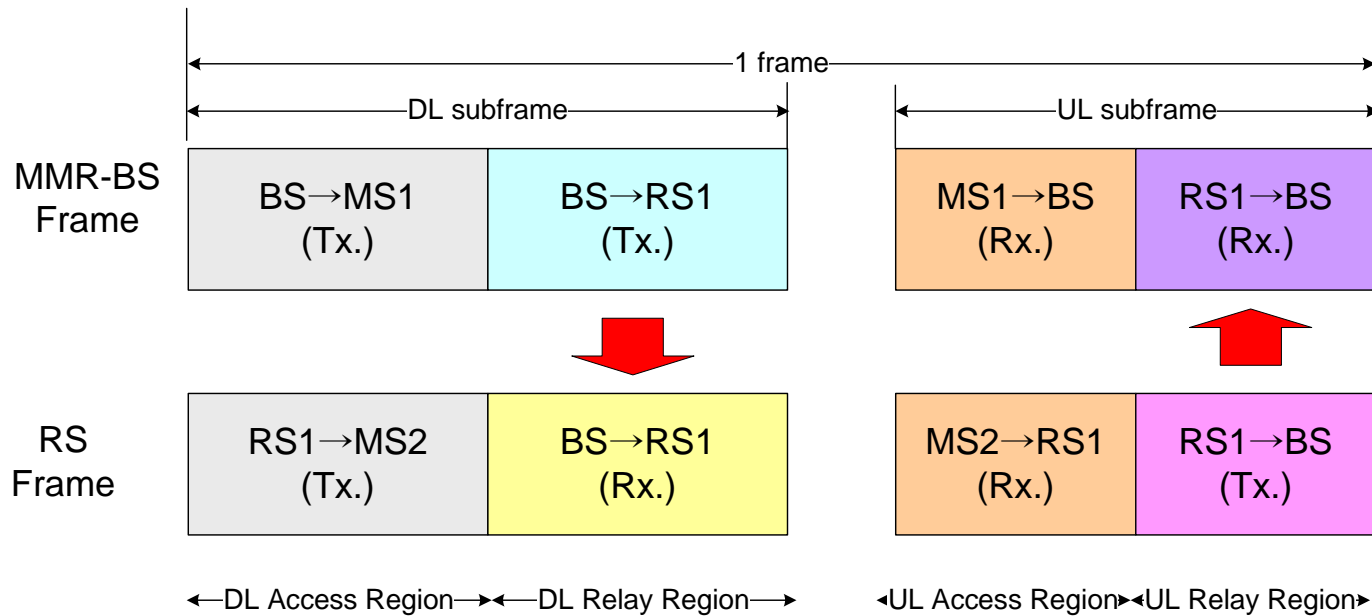
Even-hop RS: When the number of hop between MMR-BS and RS is even, then RS is called even-hop RS

**Frame structure
for 2-Hop Relay
#06/256**

Design Summary

Feature	Benefit
One Access link and One Relay link in a frame	<ul style="list-style-type: none"> ● Minimize transition gap overhead
Access link is followed by Relay link	RS to MS link (access region) comes first in the DL/UL subframe <ul style="list-style-type: none"> ● MS backward compatibility
Flexibility in division of Access and Relay regions	Increase in resource utilization
Preamble for BS/RS to MS	(RS to MS link): amble transmission at the beginning of frame <ul style="list-style-type: none"> ● MS backward compatibility
Postamble for BS/RS to RS	(MMRBS/RS to RS link): amble transmission at the end of relay region : relay link synchronization <ul style="list-style-type: none"> ● fixed amble location
	Coexistence of .16e system and .16j system

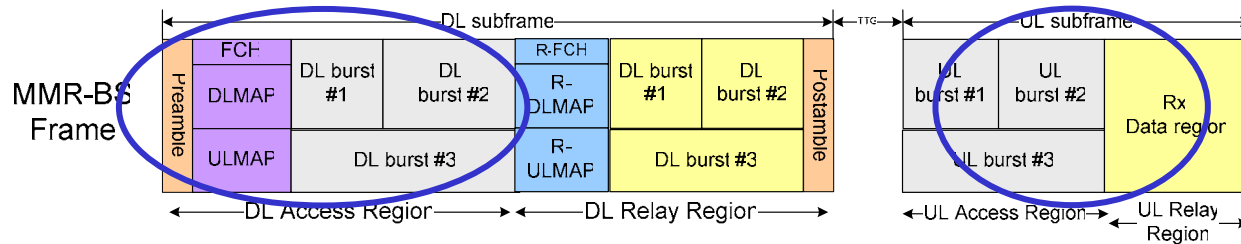
Operation of MMR-BS/RS Frame



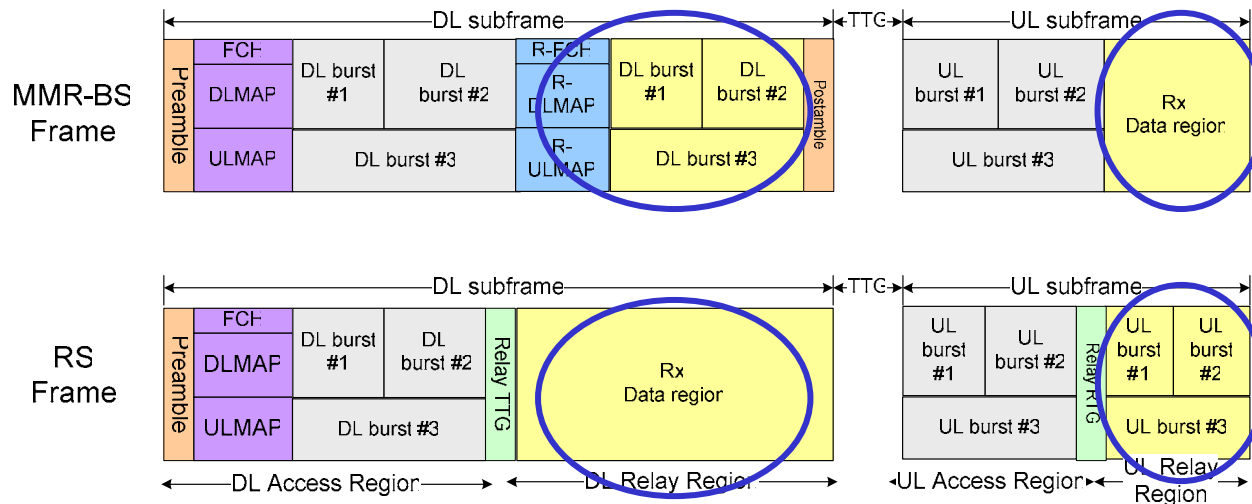
Operation in the relay region of DL/UL subframe

MMR-BS/RS Frame

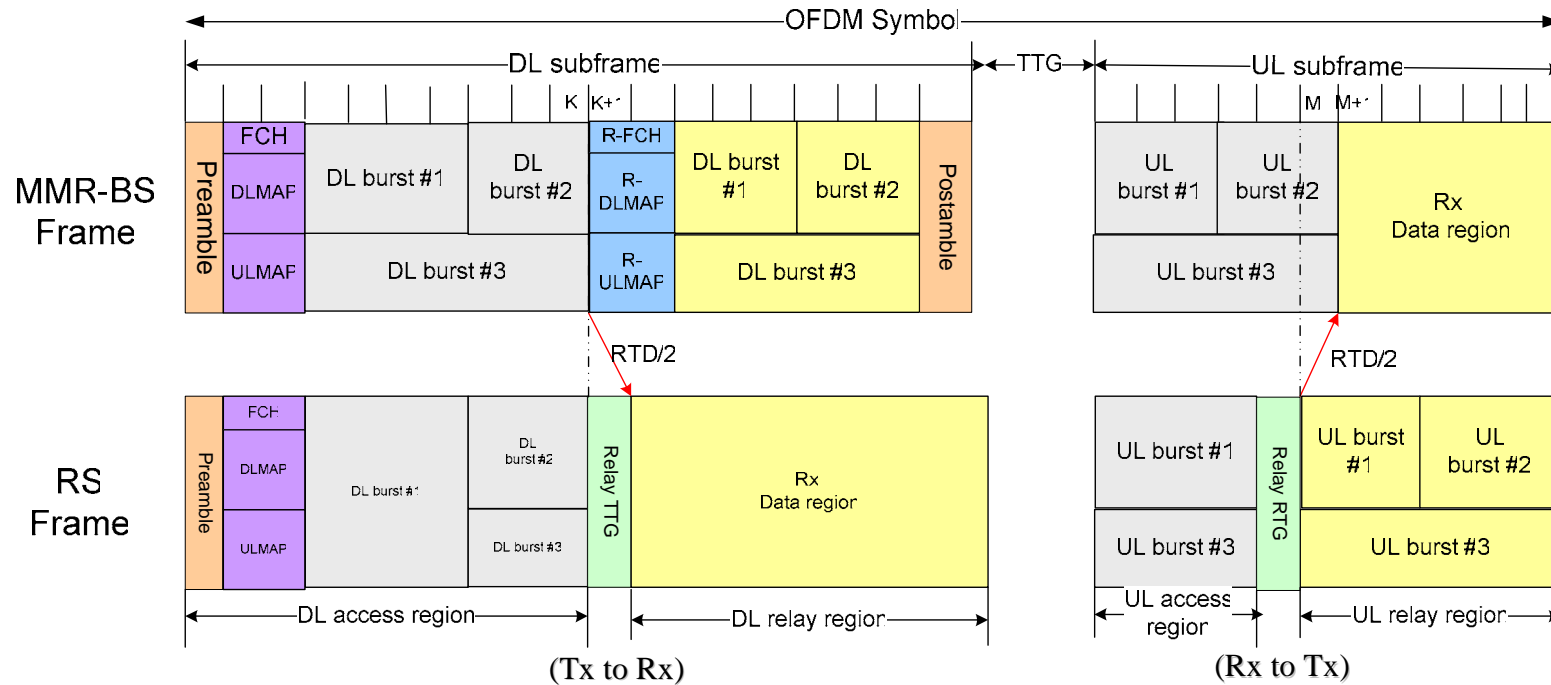
RS performs initial network entry in the **access region** of the MMR-BS frame as an MS does:



After completion of initial network entry, RS communicates with MMR-BS in the **relay region**:

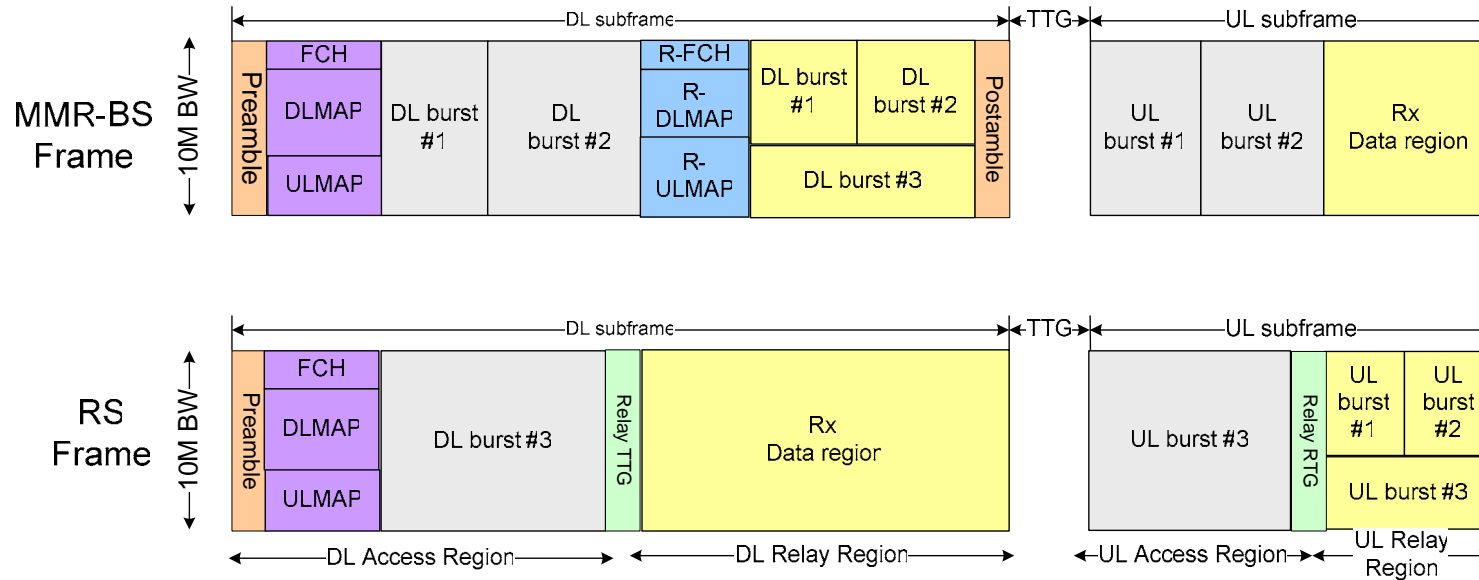


Transition Gap



- Transition Gap is needed at RS's frame
 - Due to TX/RX switching time and round trip delay
 - 1 symbol gap is enough
- To reduce overhead due to the transition gap, the number of TX/RX switching should be minimized

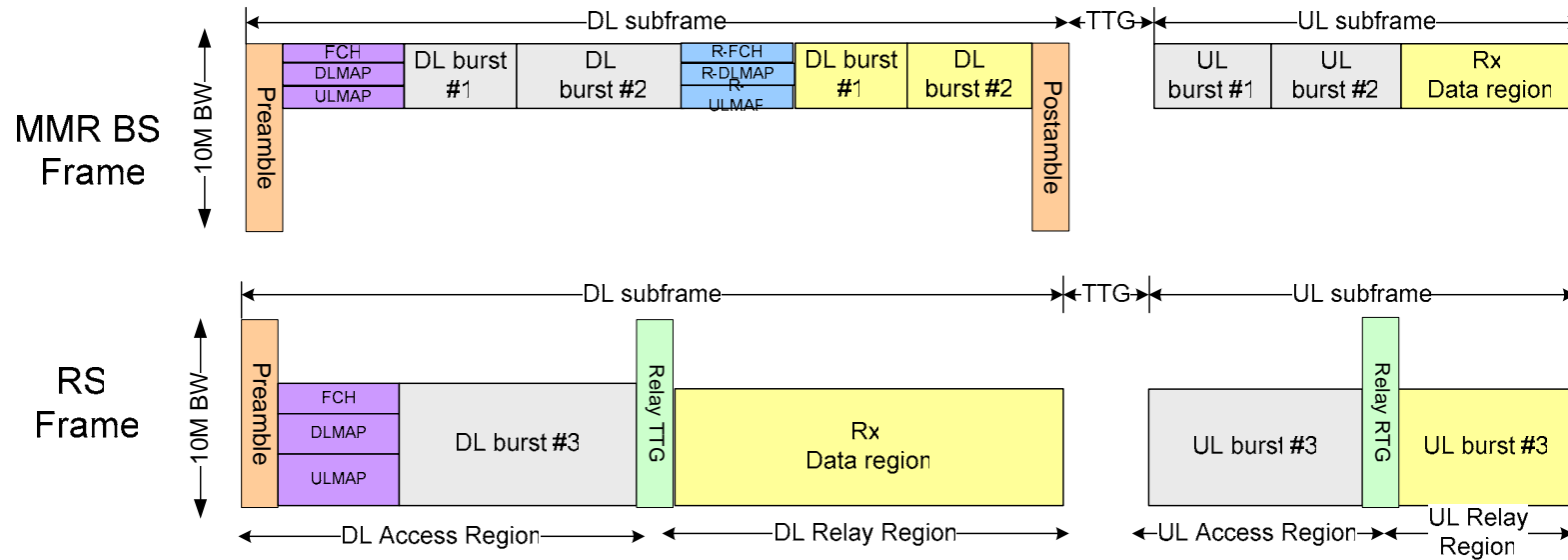
Implementation #1: PUSC with all subchannels



- Maximize radio resource with utilizing all subchannels

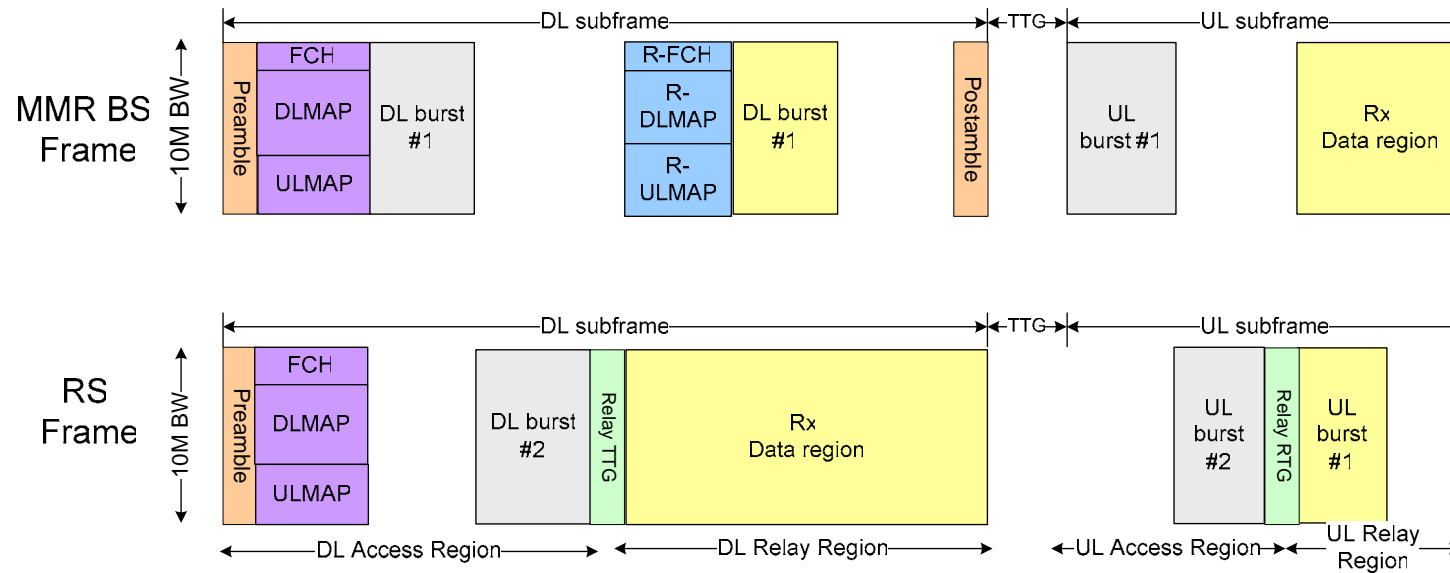
MMR-BS and RS Frame

Implementation #2: PUSC with segmentation



- Avoid interference with frequency division manner

MMR-BS and RS Frame Implementation #3: time scheduling



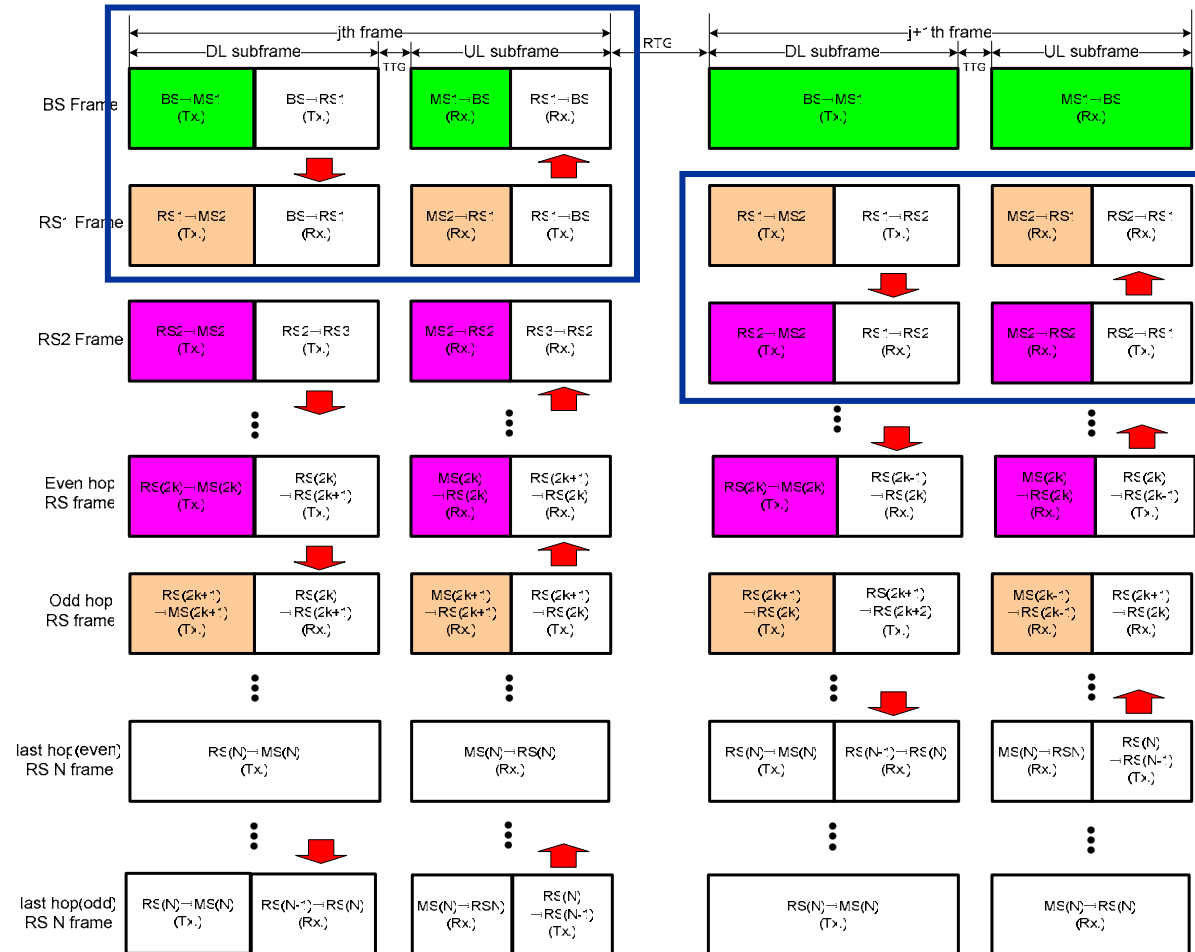
- Avoid interference with time scheduling (time division manner)

**Frame structure
for multi-hop relay
*#06/257***

Design Summary

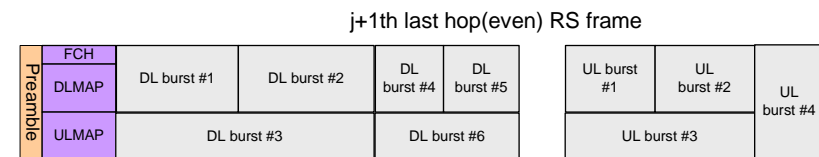
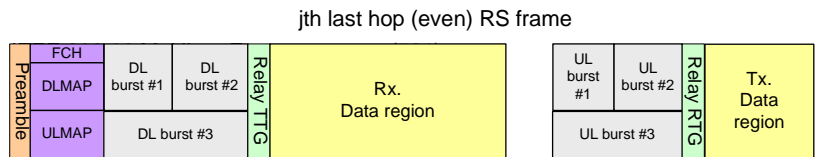
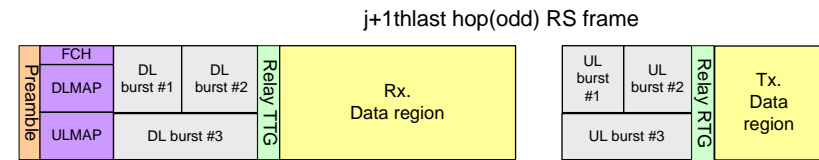
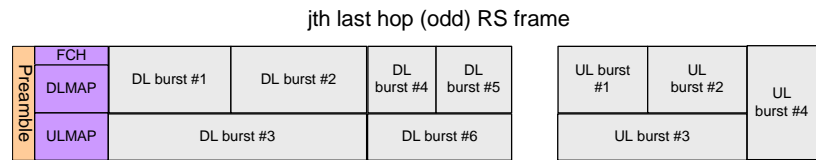
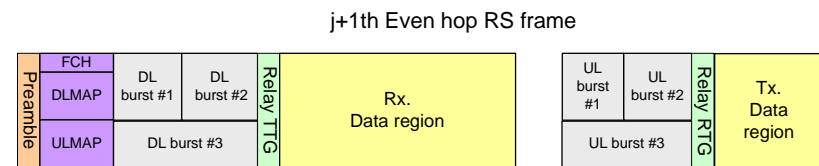
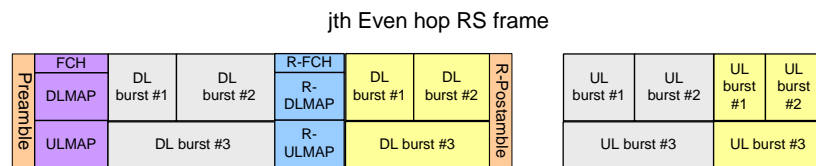
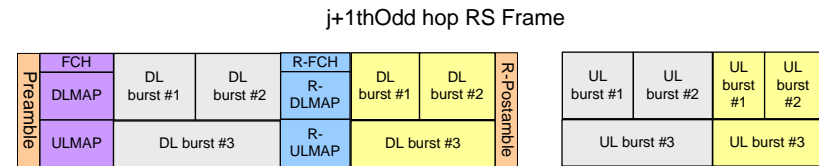
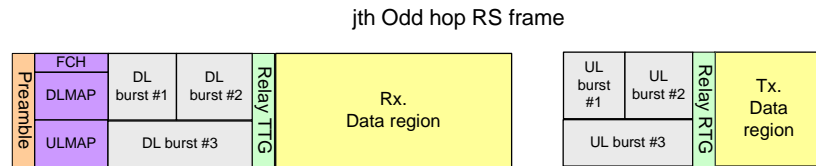
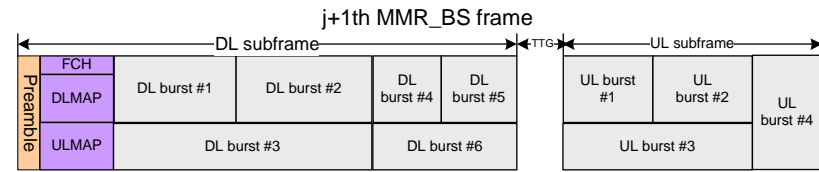
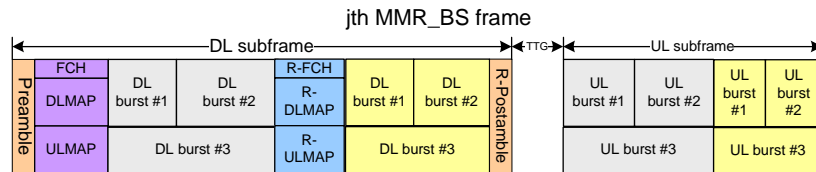
- Easy extension of 2-hop relay frame structure
- 2-frame unit
 - which allows fat pipe both for relay and access region in DL/UL subframe
 - Support coexistence of .16e system and .16j system
 - Support (DL subframe:UL subframe)=(1:1),..., (2,1),..., (3:1)
 - Support MS to RS link with minimum throughput requirement
 - Minimize the number of transition gap
 - Relax burden for fast processing to relay within 1 frame

Operation of MMR-BS/RS frame

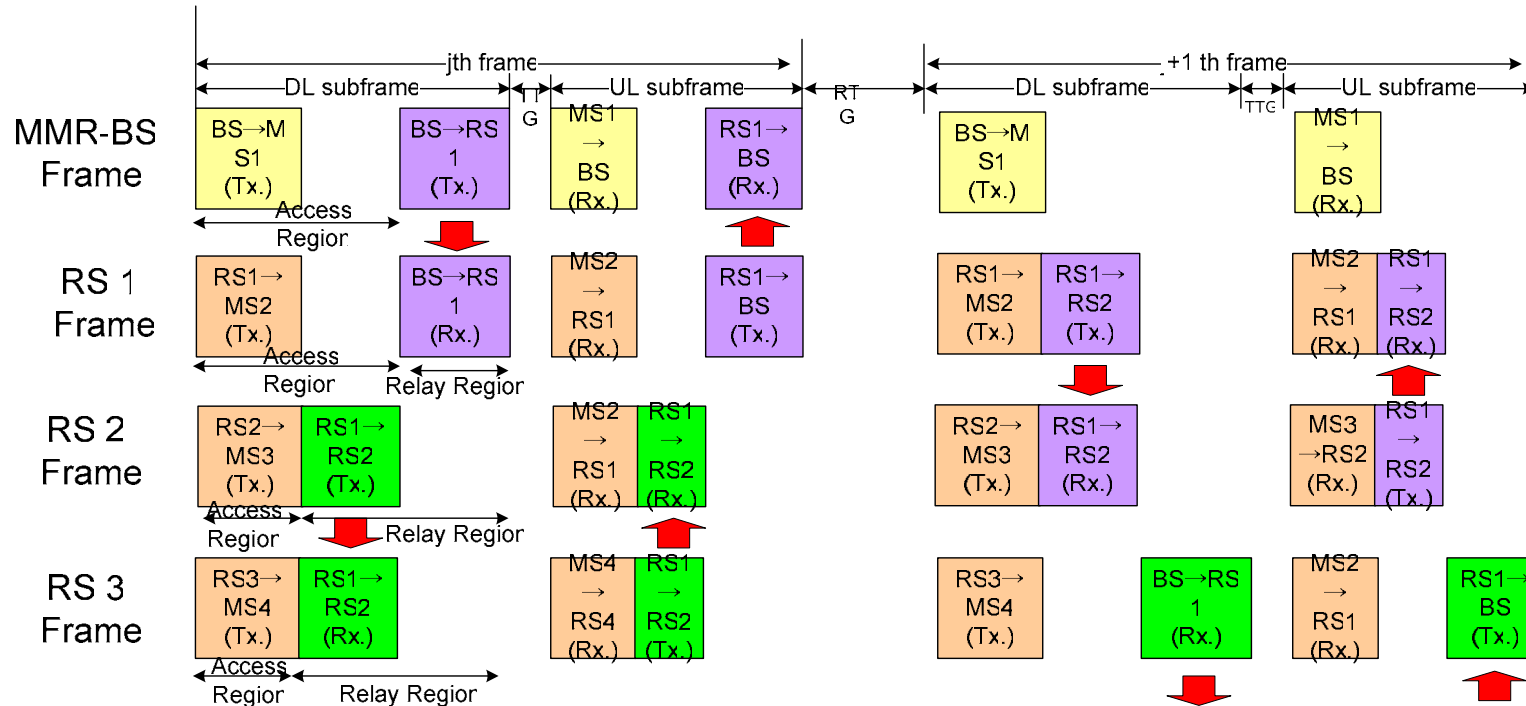


Operation of multi-hop relay frame in 2-frame unit

MMR-BS/RS frame



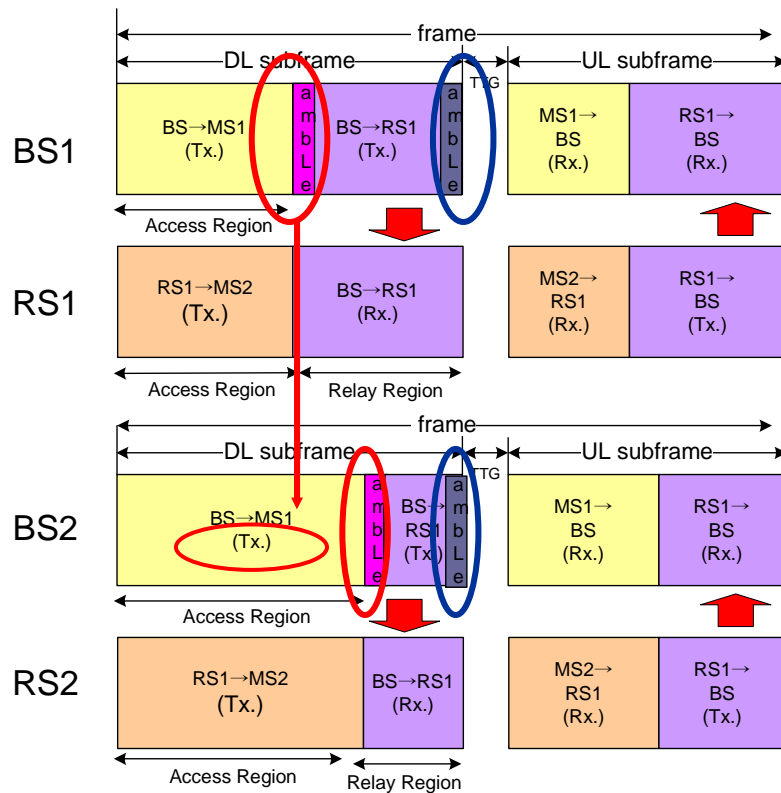
Implementation: time scheduling



- Avoid interference with time scheduling (time division manner)

Benefit of Postamble over Midamble

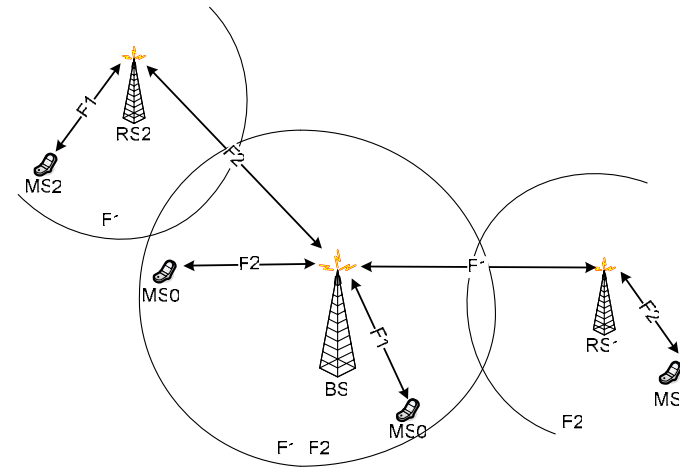
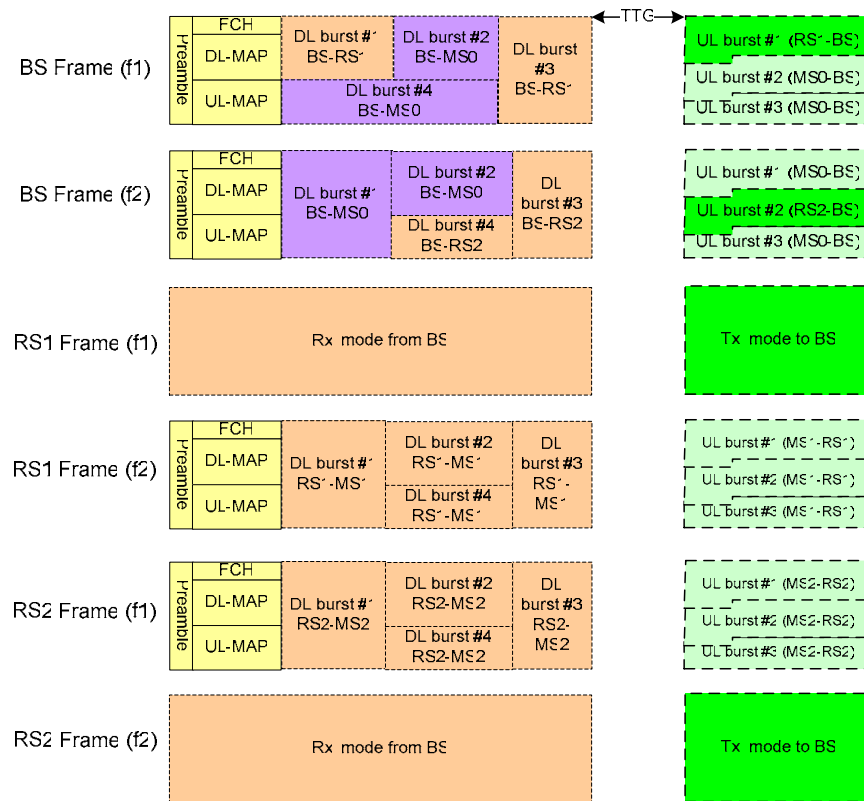
-For Dynamic change of relay region-



- Avoid Interference from boosted power (amble) to data
- Reliable CINR measurement
- Easy for quick cell search at mobile RS
- Easy for periodic channel measurement of neighbor at fixed RS

**Frame structure
for out of band relay
#06/258**

Frame Structure for out of band



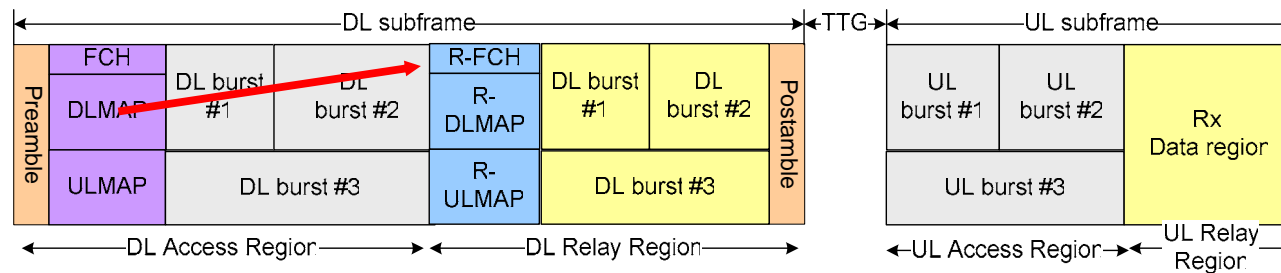
- .16e frame structure can be reused for out of band

**Initial Relay Region
Indicator
#06/260**

Initial Relay Region Indicator

After completing its initial network entry in access region,

- DL relay region: 'STC_DL_ZONE_IE' indicates DL relay region
- UL relay region: R-ULMAP assigns 'allocation start time' and 'No. OFDMA symbols'



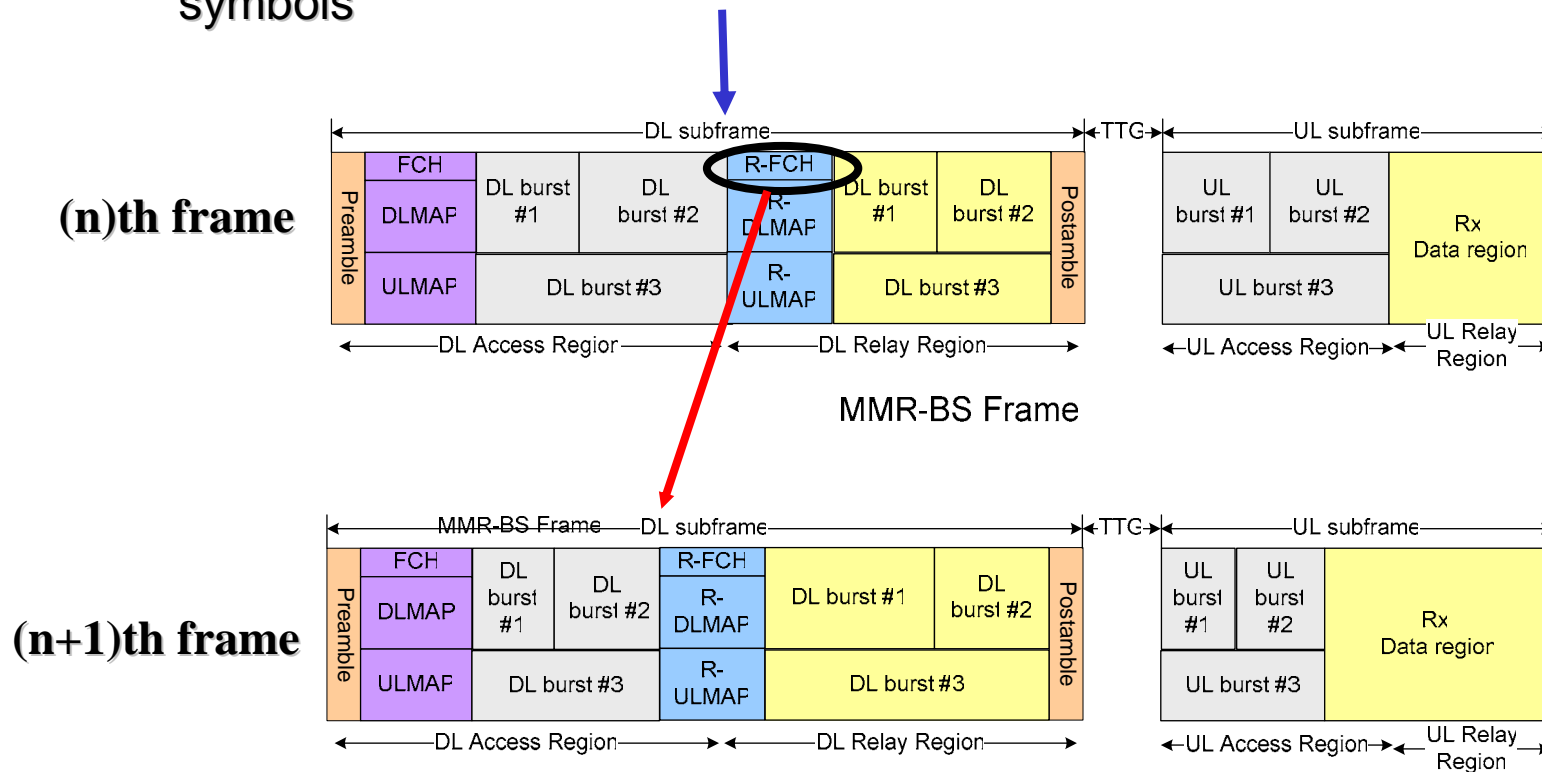
MMR-BS Frame

**Flexibility of Relay
Region
#06/263**

Flexibility of Relay Region

Time resources of access region and relay region may be changed.

- DL relay region: R-FCH indicates 'offset' of the starting point of DL relay region
- UL relay region: R-ULMAP assigns 'allocation start time' and 'No. OFDMA symbols'



Summary

- Frame Structure for 2-hop
 - Access region precedes relay region
 - Fixed amble location (relay link)
- Frame Structure for multi-hop
 - Easy extension of 2-hop relay frame
 - 2-frame unit
- Frame Structure for out of band
 - Reuse of .16e frame structure
- Initial Relay Region Indicator
 - STC_DL_ZONE_IE
- Flexibility of Relay Region
 - R-FCH