Multihop Relay Frame Structure Proposal

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Purpose:

To propose a multihop relay frame structure to support throughput enhancement and coverage extension relaying

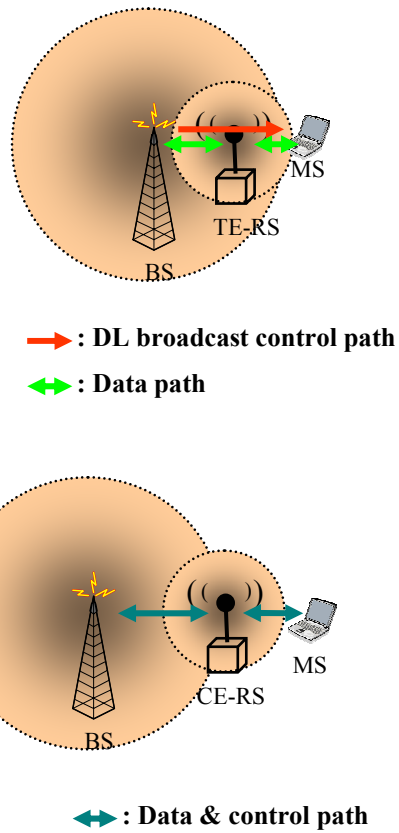
Outline

- Introduction
- Frame structure definition
- Example cases analysis
- Summary

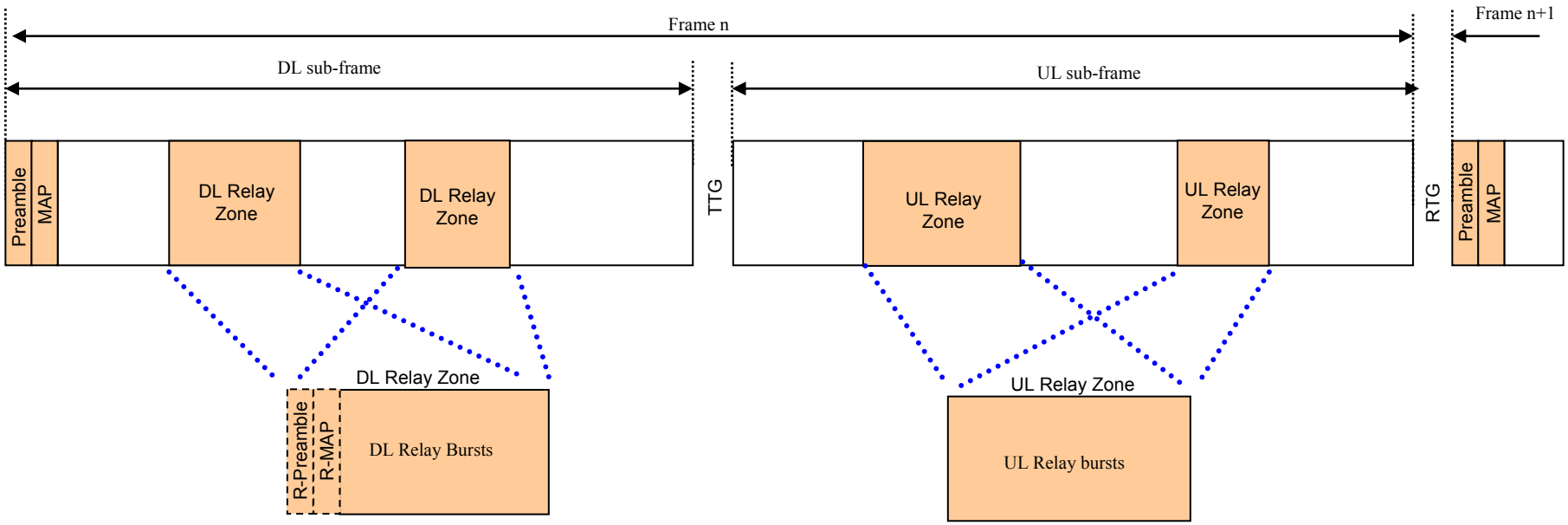
Introduction

- Requirement to frame structure
  - One frame structure to support two performance objectives – throughput enhancement & coverage extension
  - Backward compatible with IEEE802.16e

- Two sorts of relay mode introduced
  - Throughput Enhancement (TE)
    - Improve the throughput of MS located inside BS coverage
  - Coverage Extension (CE)
    - Provide access to MS in coverage hole or isolated areas
    - MS gets preamble and MAPs from RS

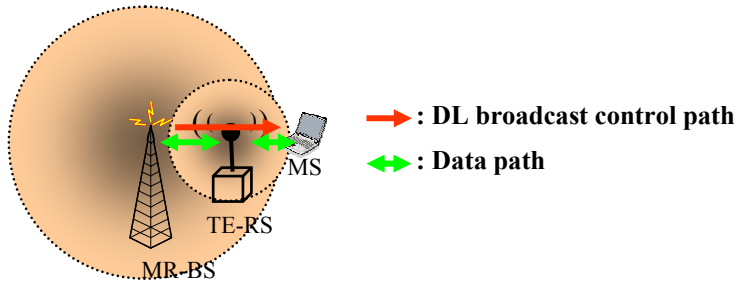


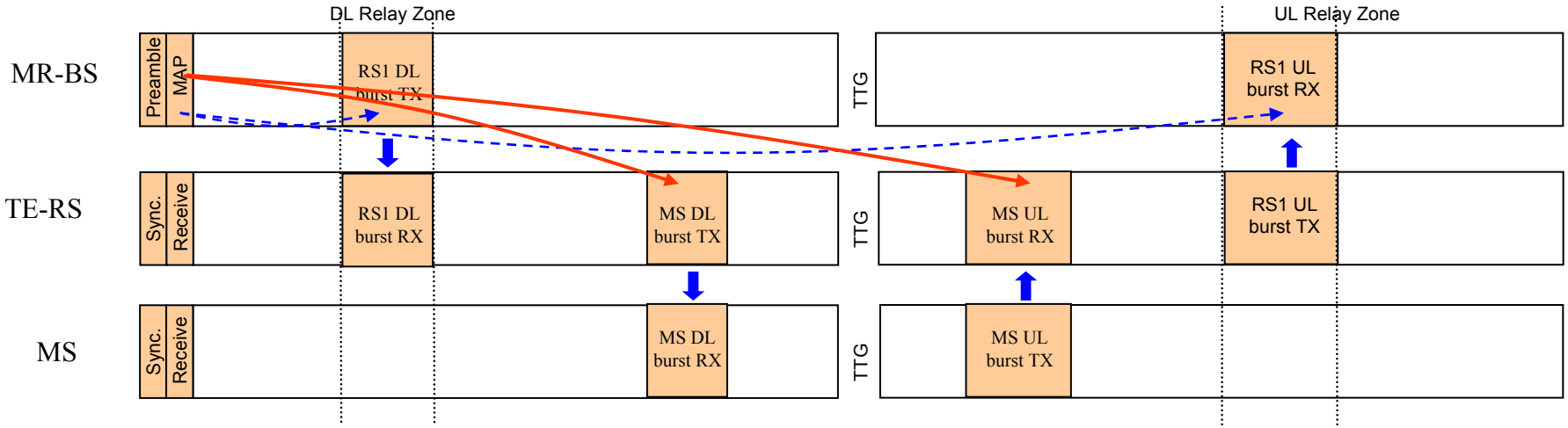
Frame structure for Multi-hop relay



- **Relay zones for traffic forwarding between BS and RS, or between two RSs**
  - Optional relay preamble (R-Preamble) and relay MAP (R-MAP)
    - For CE-RS synchronized with its access station
- **Preamble and MAP at the beginning of frame**
  - TE-RS and MS use it to get synchronization and MAP
  - BS and CE-RS simulcast same preamble and MAP when they work at same radio channel

Relaying frame structure for throughput enhancement

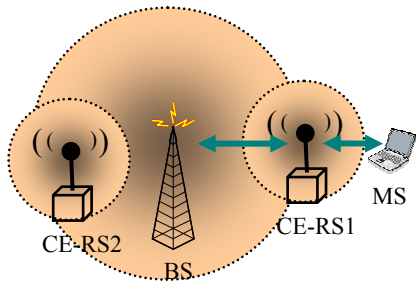


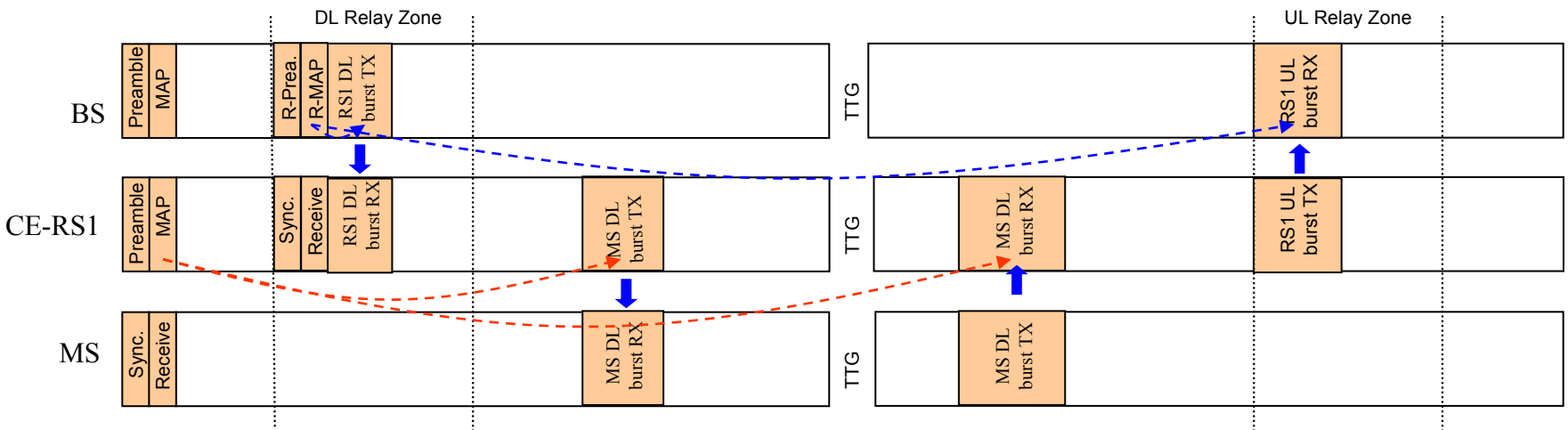


- Both TE-RS and MS synchronize with MR-BS via frame preamble
- Both TE-RS bursts and MS bursts are allocated in the MAP of BS
- Ranging channel is shared by MS and TE-RS
  - TE-RS perform initialization ranging via it
  - Also receive and measure the ranging signal from MS

Relaying frame structure for coverage extension

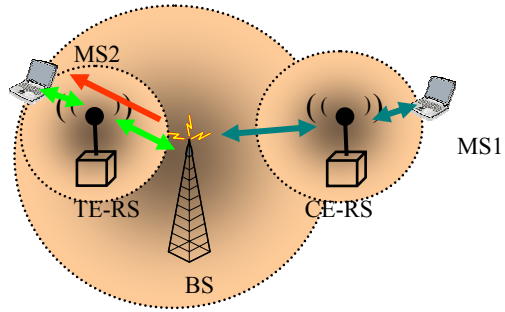
- Dedicated R-Preamble and R-MAP at the beginning of the DL relay zone
  - For subordinate RS operations (Synchronization and relay bursts)
  - R-preamble is transparent to MS
- BS and CE-RSs simulcast same frame preamble and frame MAP
  - MS synchronize with CE-RS and get MAP
- Ranging channel is shared by MS and CE-RS
- Easily extended to multihop

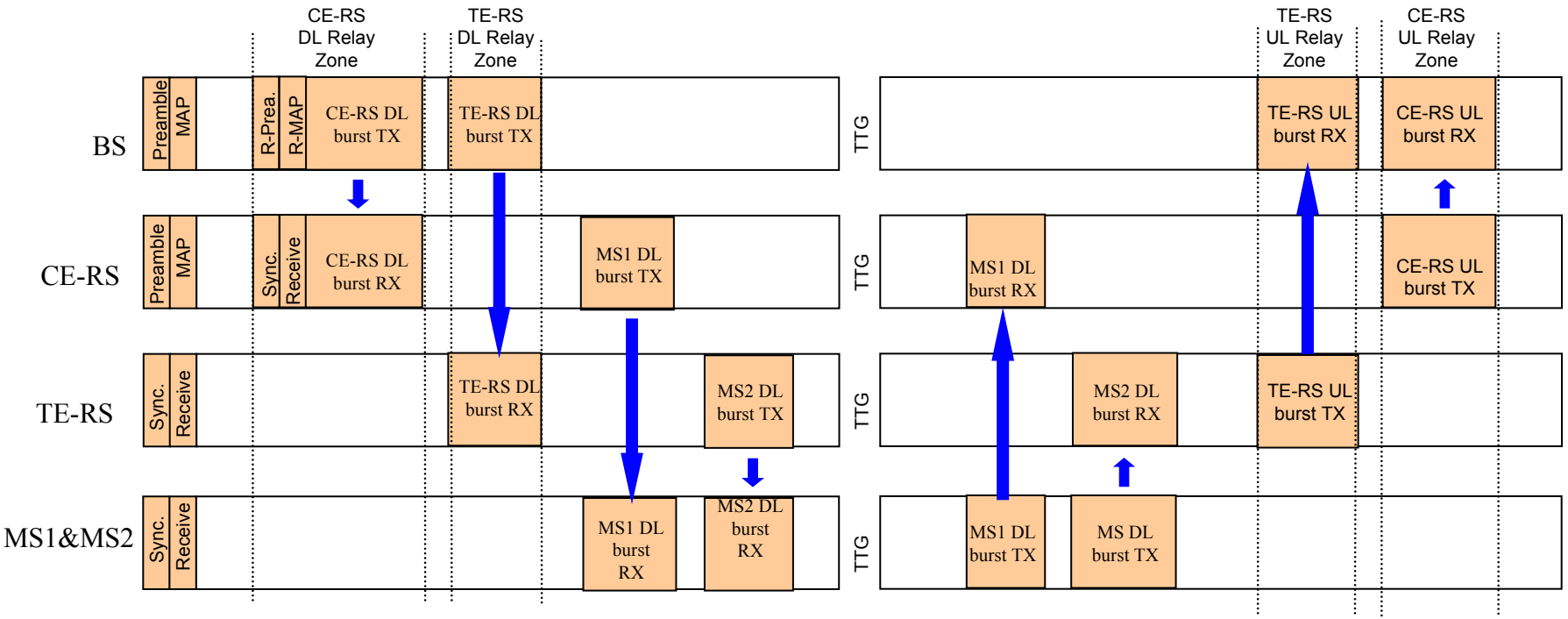




Relaying frame structure for coexistence of CE-RS and TE-RS

- CE-RS and TE-RS have different relay zones
- TE-RS and CE-RS can cascade





Summary

- One TDD relaying frame structure for CE-RS and TE-RS
  - CE-RS synchronize to its access station by using dedicated R-Preamble in DL relay zone
  - TE-RS synchronize with MR-BS as the same as MS does
- All MSs of one MMR cell synchronize to the same frame preamble
- Common ranging channel shared by MS and RS