

Duplex and Multiplex Configurations for OFDMA In-Band Relay

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Purpose:

To present a single RF head in-band relay duplex and multiplex for IEEE802.16e OFDMA mode

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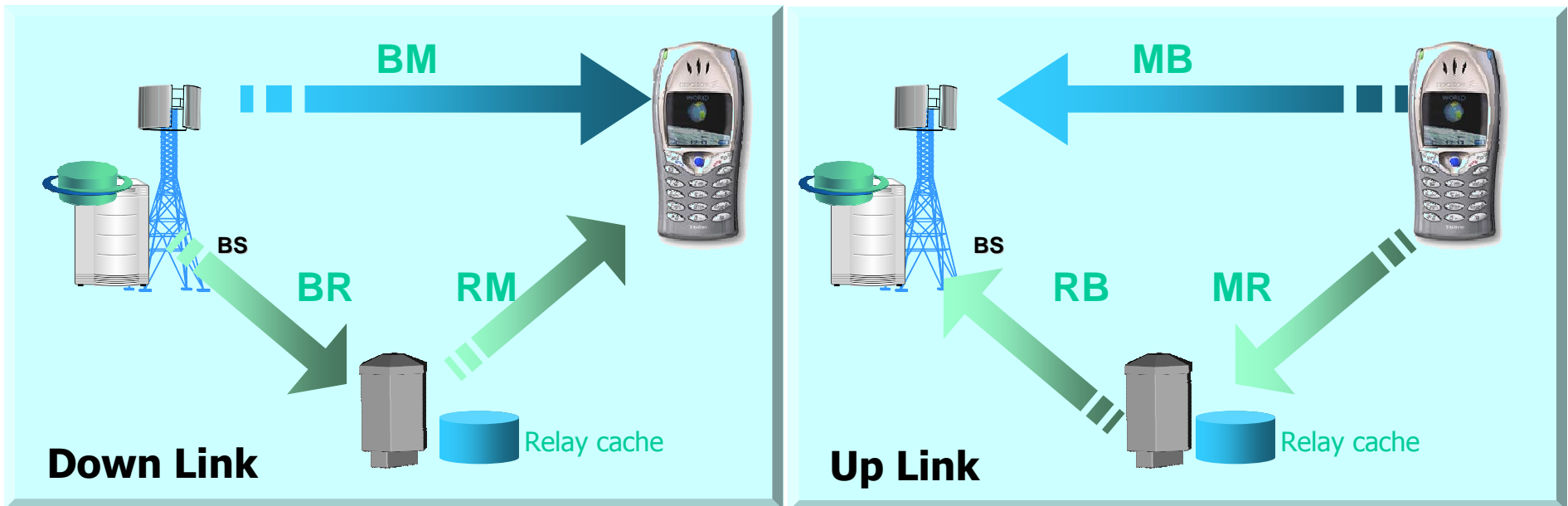
Background

- The Meshed Wireless Network Vision
 - Introduce the relay function in the conventional cellular network
 - To allow to extend to multi-hop network topology
 - To allow to extend to mesh network topology
- To enable multi-hop and/or mesh network
 - Require new duplex RF architecture for
 - FDD and TDD arrangement
 - Require new multi-user multiplex scheme to
 - Increase spectrum efficiency and reduce interference
- Analogy relay
 - External band relay
 - **Dual RF transceiver chains** (Double Cost!)
 - In-band relay
 - Noise enhancement and feedback isolation
- Digital relay
 - External band relay
 - **Dual RF transceiver chains** (Double Cost!)
 - TDD in-band relay
 - FDD Solution with Conventional FDD RF Head

This contribution aims to present the possible duplex/multiplex configurations in the IEEE802.16 OFDMA context

New Networking Modes and Topologies

(Fixed Relay Station)



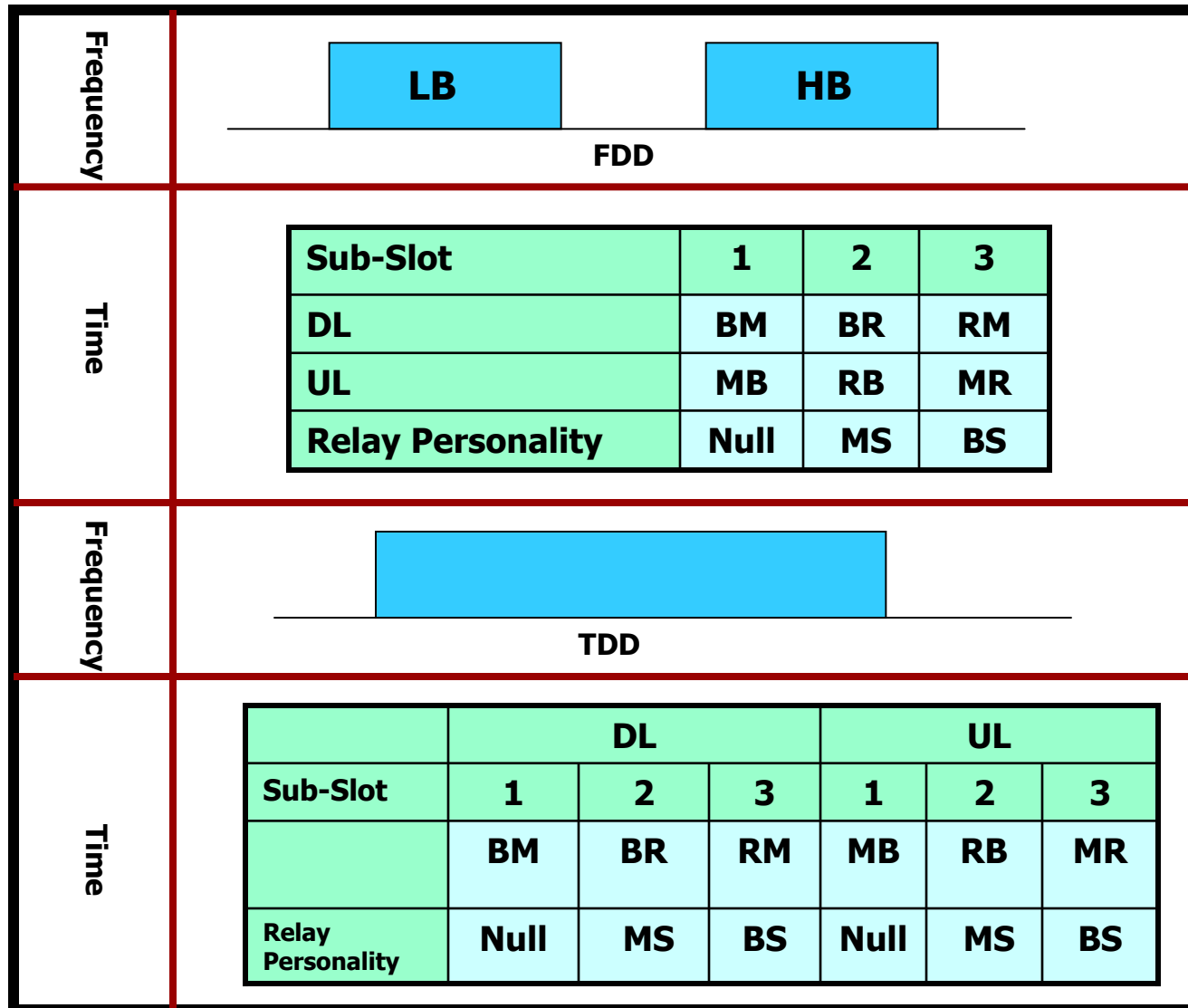
- **Down link direction**

- BS to MS (BM)
- BS to FRS (BR)
- FRS to MS (RM)

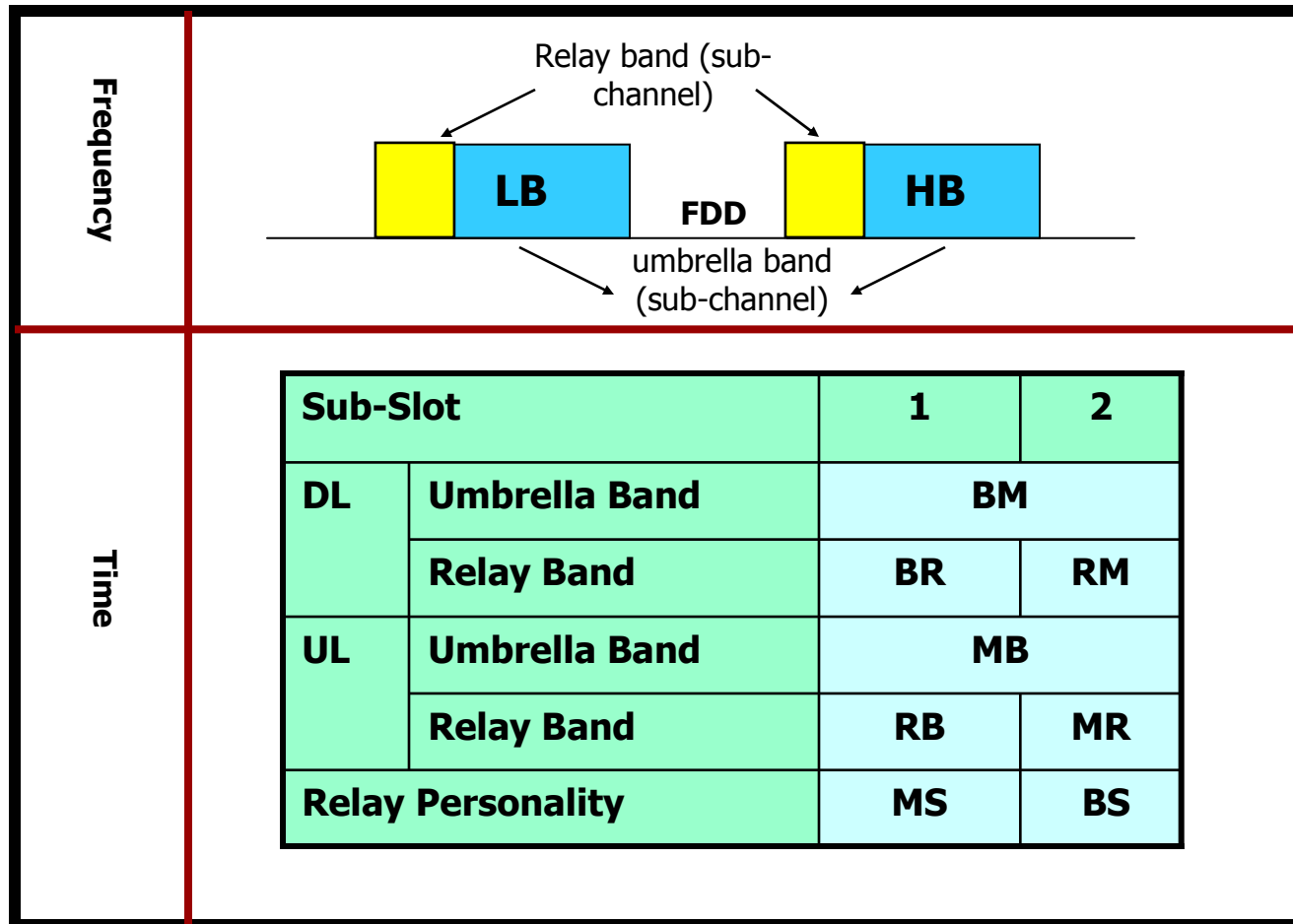
- **Up link direction**

- MS to BS (MB)
- MS to FRS (MR)
- FRS to BS (RB)

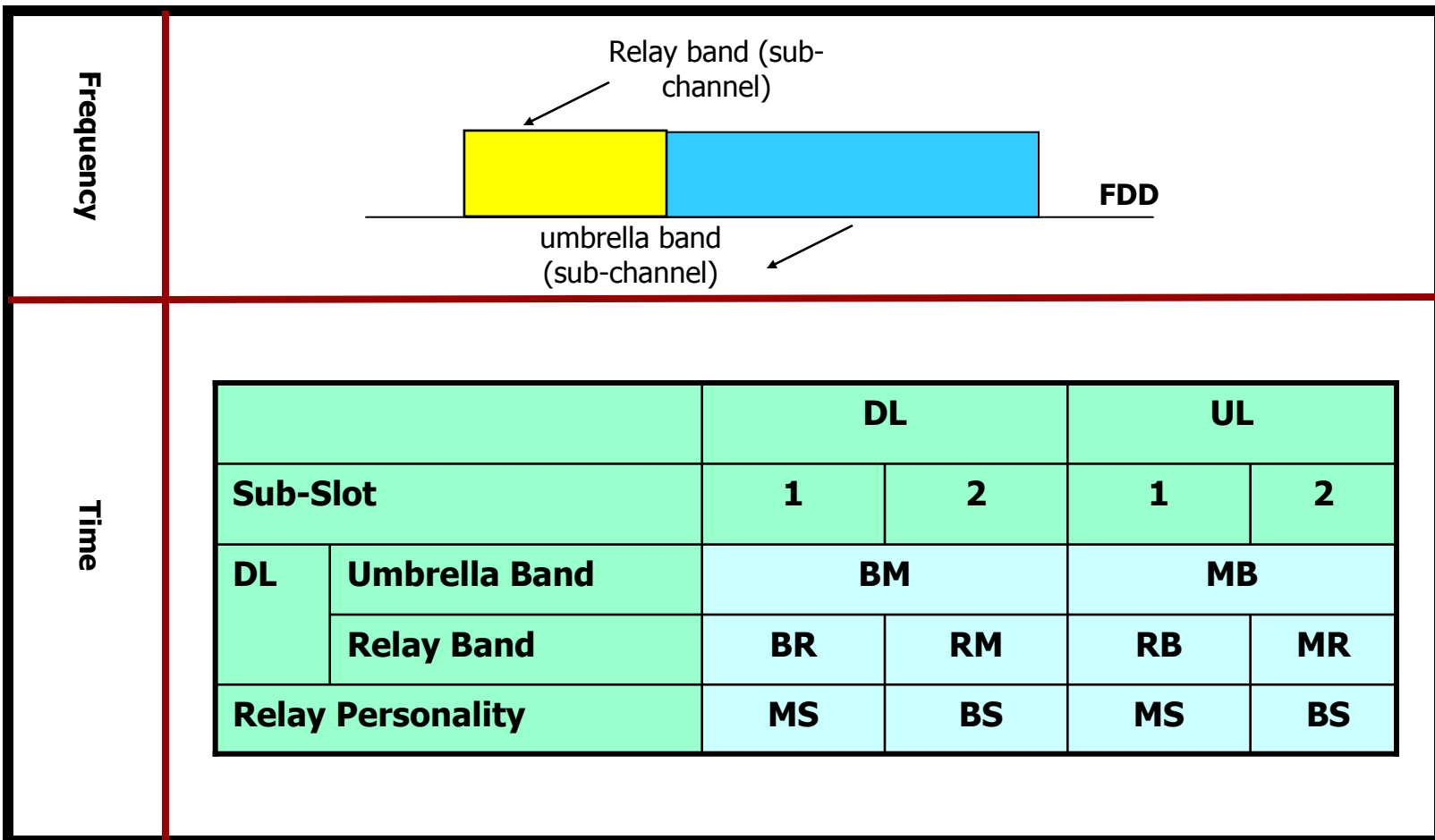
In-Band OFDM/TDM Relay Mode



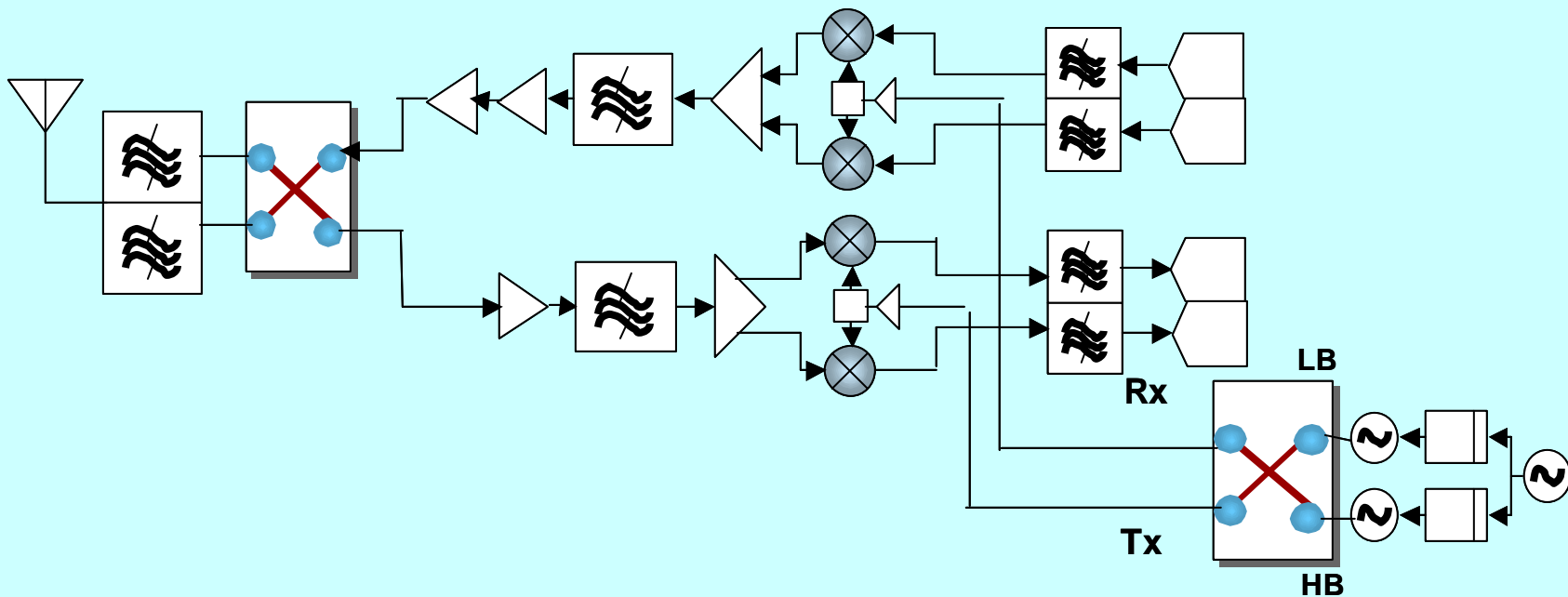
In-Band OFDMA/TDM Relay FDD Mode



In-Band OFDMA/TDM Relay TDD Mode



Relay Node Zero-IF Architecture with Variable Duplexer or Switched Duplexer



A single transceiver with switch matrix for Relay Node reduces the cost

Summary and Applications

- An OFDMA/TDM hybrid relay multiplex and duplex arrangement is presented
 - The relay performance can be optimized by
 - Allocation of relay band (relay sub-channels)
 - Allocation of relay slot
- Relay node architecture with variable duplexer and switched RF synthesizer enable FDD Relay
- Relay-node link configuration can be paired with spectrum allocation for relay band
 - The configuration can be combined with TDM and OFDMA operation
 - The configuration can be combined with TDD and OFDMA operation
- To keep the relay node RF chain simple, only one configuration per node is allowed for a given time slot