

IEEE 802.16m Downlink Resource Mapping

Document Number:

IEEE C802.16m-08/503

Date Submitted:

2008-05-12

Source:

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Venue:

TGm – DL PHY

Base Contribution:

IEEE C802.16m-08/503

Abstract:

Proposal for 16m downlink resource mapping.

Purpose:

Adoption of proposed text/content for 802.16m System Description Document

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Considerations for Distributed Allocation

- ❑ Multiple proposals for DRU size
 - One subcarrier
 - Fraction of a PRU (18 subcarriers by 6 OFDM symbols)
 - One PRU
- ❑ Small size DRU
 - Pros
 - Better frequency diversity for small payload traffic (VoIP)
 - Cons
 - Difficult to use dedicated pilot
- ❑ Large size DRU
 - Pros
 - Better CE performance with dedicated pilot
 - Cons
 - Lack of frequency diversity for small payload traffic (1 PRU), and 1 Tx antenna
- ❑ Propose to support both small and large size DRU

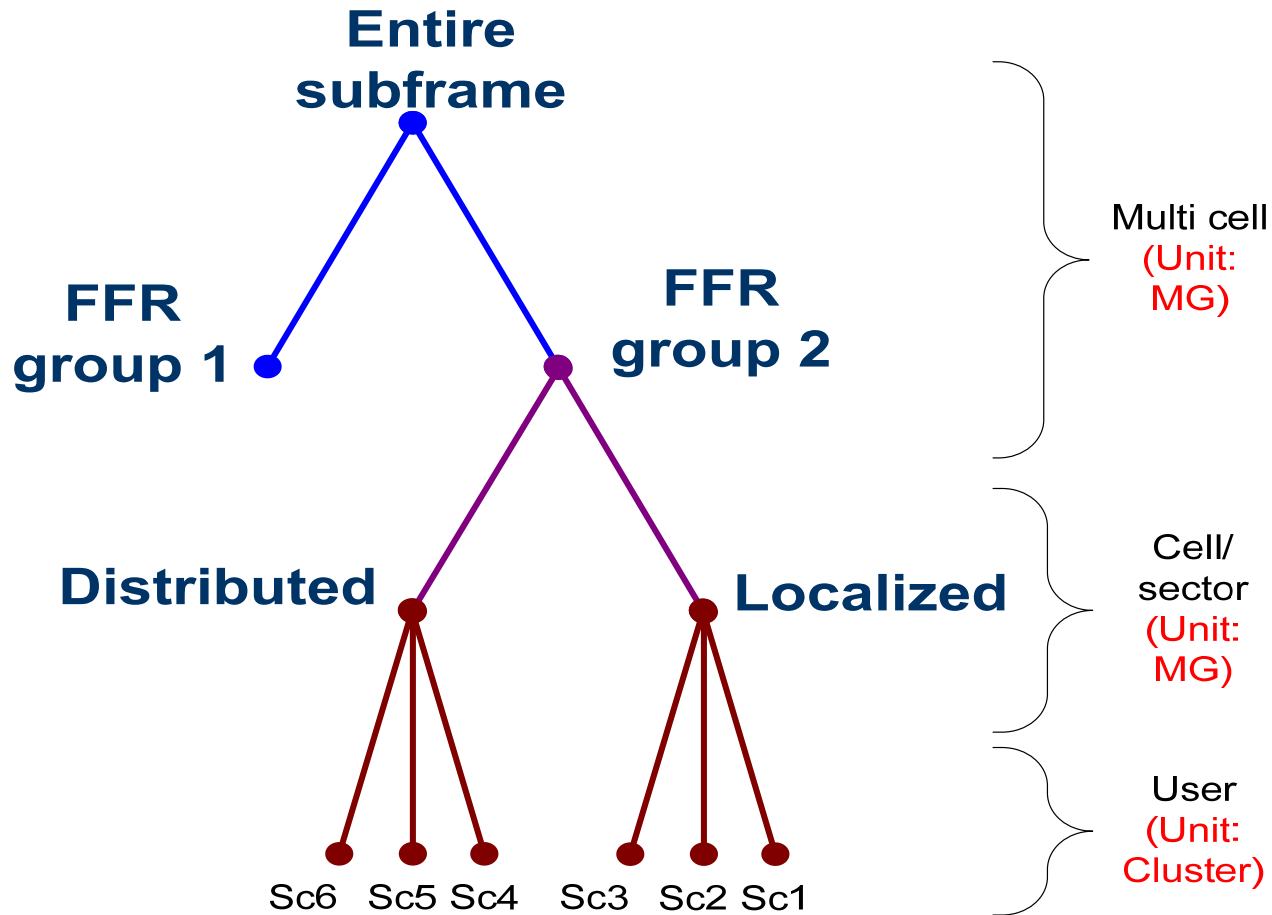
Considerations for Localized Allocation

- ❑ Minimum localized resource unit (LLRU) for is one PRU
- ❑ What is the minimum “band” for localized allocation?
 - “Band” is the minimum number of contiguous LLRU in localized mode
 - “Band” may facilitate channel feedback in localized mode
- ❑ Propose to include 4 PRU in one localized band
 - Equivalent to “logic band” in B-AMC in WiMAX

Terminology (Tried to relate to 16e)

- ❑ Major group
 - Multiple of clusters
 - Proposed value: 4
- ❑ Cluster (PRU in current SDD text proposal)
 - 18 subcarriers by 6 symbols
- ❑ 10 MHz channel contains 12 major groups
- ❑ The minimum resource allocation unit for FFR grouping is one major group
 - One FFR band consists of multiple major groups
- ❑ The minimum resource unit in splitting distributed/localized band is one major group
 - Total BW for distributed allocations is multiple of major group
 - Total BW for localized allocations is multiple of major group

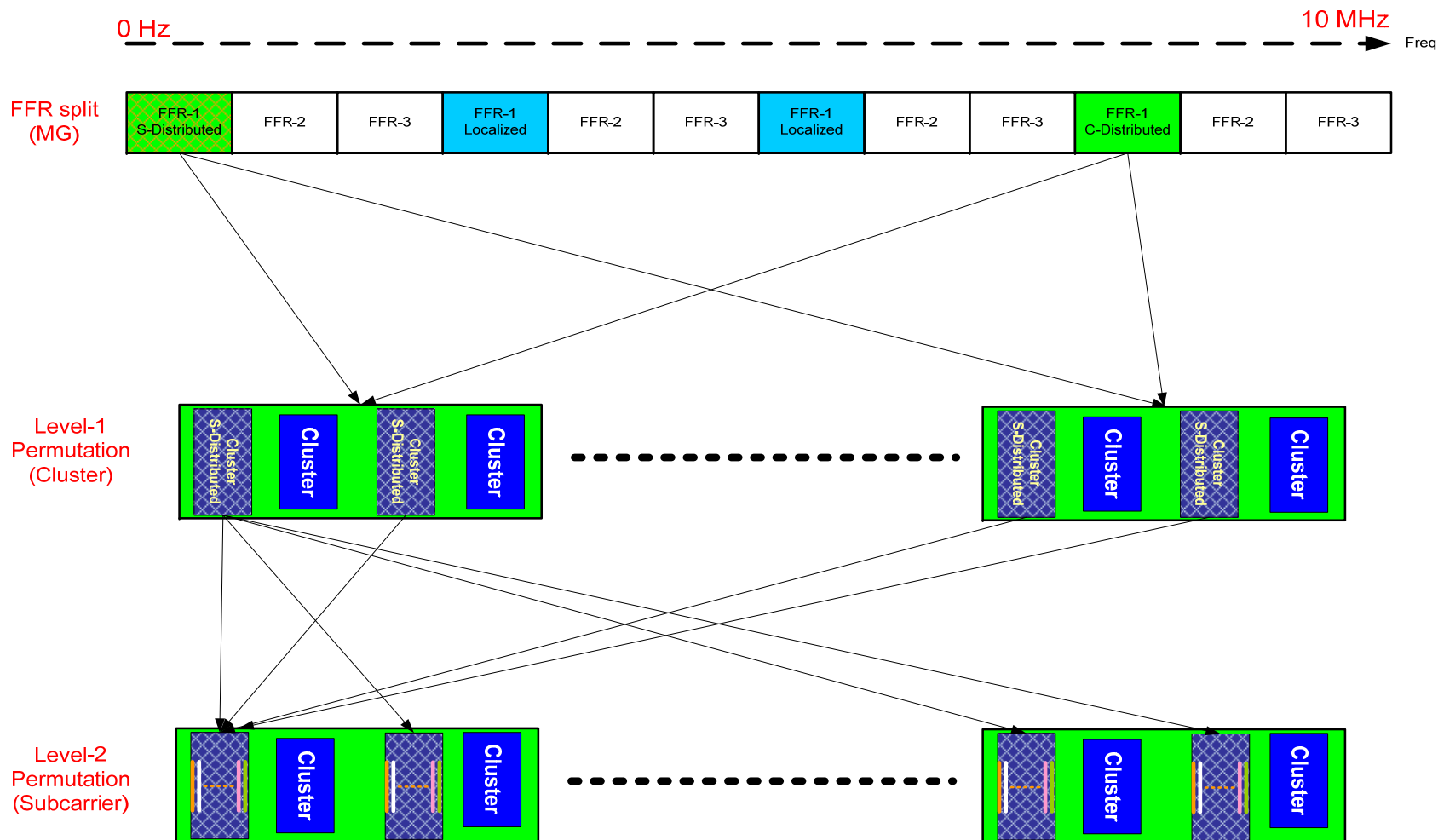
Resource tree



Resource Mapping Procedure

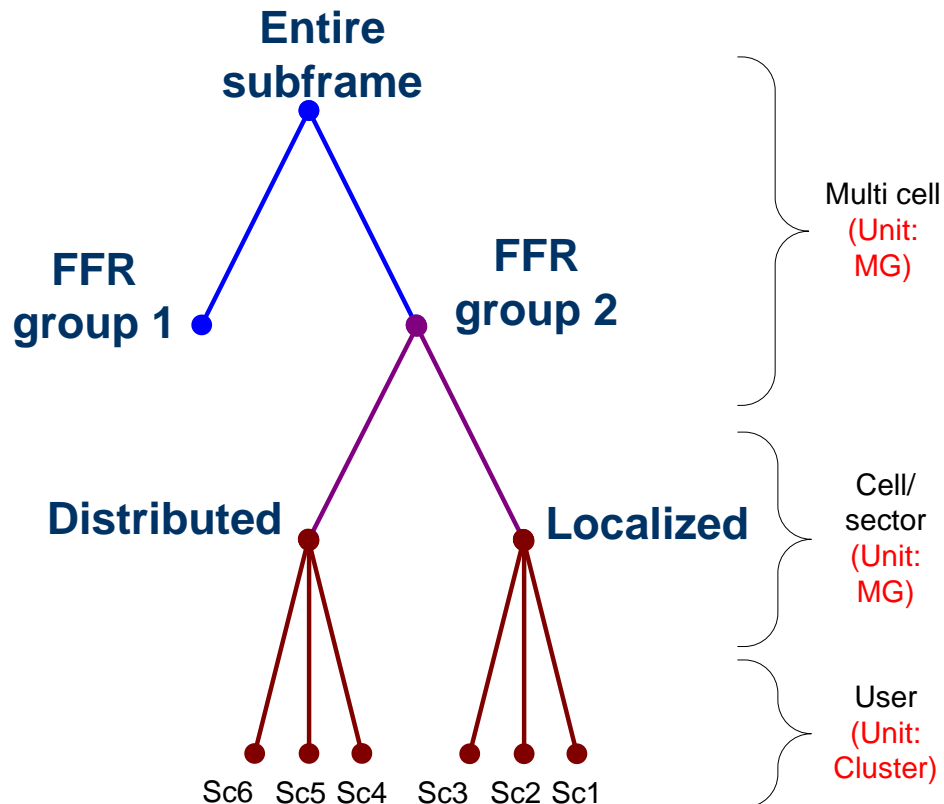
- ❑ Step-1 (using an example of 10MHz BW)
 - For one sector, X major groups are allocated with FFR
 - Within the X major group, Y major groups are distributed, and Z major groups are localized
 - 4Y clusters are distributed
 - This control signal is semi-static, but might be essential for initial access. can be at super frame header, or higher layer message
 - Maximum 24 bits (Each MG 2 bits: 1-bit for FFR, 1-bit for localized/distributed)
- ❑ Step-2
 - Permute the 4Y clusters across the whole frequency band except the Z localized major groups
 - The permutation should be a function of: 4Y, sector id, Z
 - This step can be done without signaling
- ❑ Step-3
 - For some major groups within the Y major groups, subcarriers (or pair of subcarriers to support SFBC) can be further permuted
 - This permutation is triggered by signal in dedicated resource allocation (dedicated control)
 - Permutation function is fixed
 - If trigger, subcarriers within a MG is permuted → similar as current 16e
 - Option-1: Dedicated control signal: Resource allocation for each user includes 1 bit indicating subcarrier or cluster distributed mode.
 - Option-2: semi-static signal, Maximum 12 bits (all 12 major groups are in distributed mode)
 - Example: 1 1 1 0 0 1 1 0 0 0 0 0 → MG 0 1 2 5 6 are permuted at SC level; MG 3 4, 7 to 11 are permuted at cluster level

Resource Mapping Procedure (An example of FFR=1/3)



Proposal for 16m Resource Mapping

- Replace Fig. 11.5.1 in C802.15mDL_PHY-08/046 by the following figure (including resource unit for each step of allocation in red)



Proposal for 16m Resource Mapping

- ❑ page 3, line 3, of section 11.5.1.1 of C802.16mDL_PHY_08/046
- ❑ **Support 1 subcarrier *and* 1 PRU for DRU size**
 - Subcarrier distributed mode (DRU = 1 sc) can be used for VoIP traffic
 - Cluster distributed mode (DRU = 1 PRU) can be used for large payload traffic
 - BS scheduler may choose and indicate which DRU size to use based on channel and traffic

Proposal for 16m Resource Mapping

- page 3, line 27, of section 11.5.2.2 of C802.16mDL_PHY_08/046

0-1. Partition FFR major groups in frequency

0-2. Partition localized and distributed major groups in frequency

1. For distributed major groups, a first-level or outer permutation is applied to the PRUs within the distributed major groups ~~entire frequency band~~

~~2. The permuted PRUs are arranged into frequency partitions, e.g., FFR groups.~~

~~3. Each frequency partition is further divided into DRUs and/or LLRUs, i.e., each frequency partition may contain both distributed and localized resource allocations.~~

4. For subcarrier distributed major groups indicated by BS, a second-level or inner permutation is performed for these subcarrier distributed major groups. ~~exists only for the DRUs.~~

Proposal for 16m Resource Mapping

- ❑ Allow coexisting of subcarrier distributed mode, cluster distributed mode, localized mode within one symbol

- ❑ Contribution C802.16m-08/504 provide link simulations to justify
 - Choosing 4 PRUs for one MG
 - Performance gain of including cluster distributed mode (DRU = 1 PRU)