Diversity Issues with the DLRU Subchannelization (Section 15.3.5.2.1 and 15.3.8.2.1)

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Re: P802.16m/D2 comments for LB30a
Area: Section 15.3.5.3.1 – DL PHY Structure and Section 15.3.8.3.1 – UL PHY Structure

Purpose:
In the PHY structure, when the maximum number of sub-band CRUs is allocated, the location of the PRUs allocated to be DRUs is not well suited for frequency diversity.

Diversity issues with the DLRU subchannelization
DL: Section 15.3.5.2.1
UL: Section 15.3.8.2.1

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Problem Statement

- The A-MAP is required to be transmitted in DRUs
- All subframes are required to have an A-MAP
- When the PHY structure is configured for the maximum allowable number of sub-bands (e.g., the UMi/InH configuration), only a small number of PRUs are allocated to be DRUs
- Those small number of DRUs are poorly placed given the intent to maximize diversity.

Review:
Key Variables for Configuring the DL PHY structure

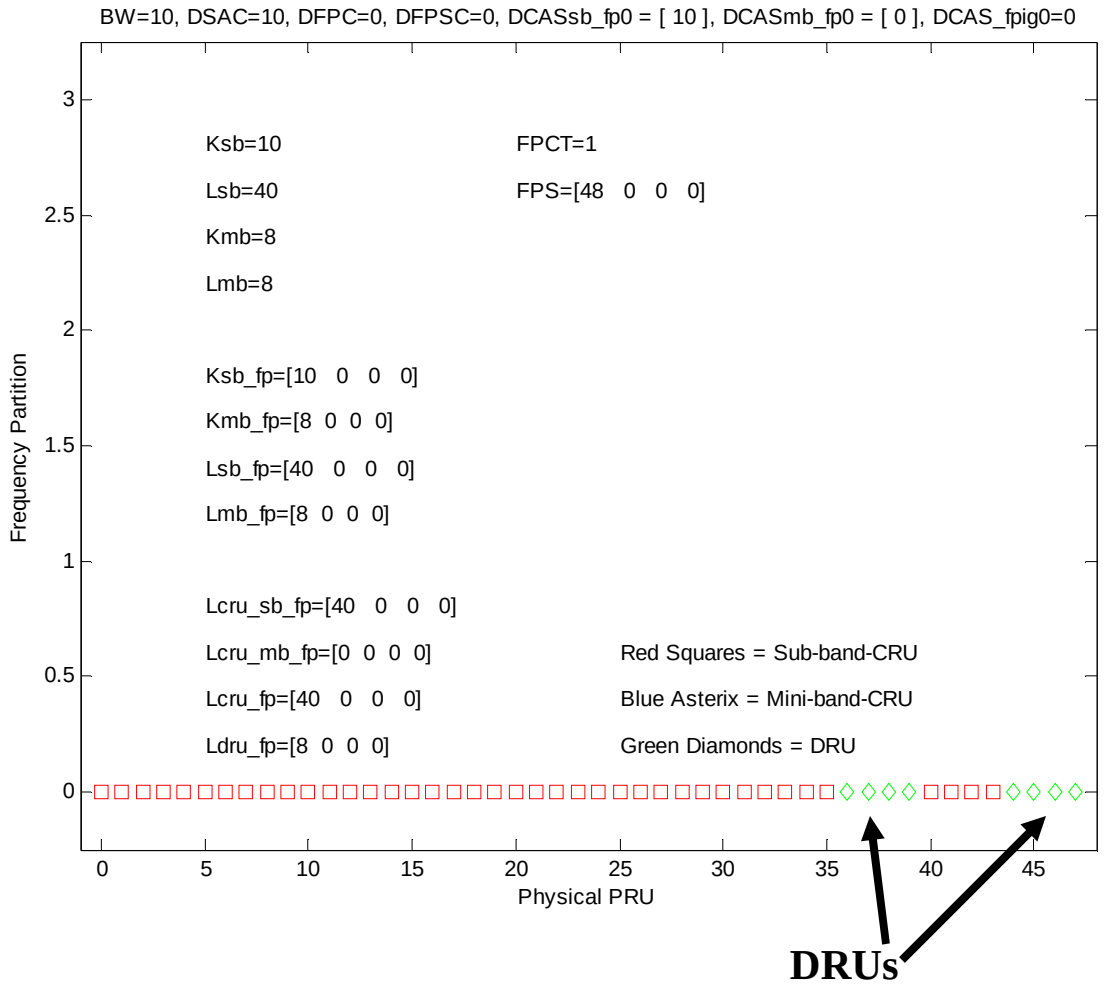
- **DSAC** = DL Sub-band Allocation Count
  - Determines Number of Sub-bands Ksb according to Tables 768-770
- **DFPC** = DL Frequency Partition Configuration
  - Determines number of Frequency Partitions and the split of PRUs across the partitions (Tables 771 – 773)
  - Determines Frequency Partition Count (FPCT)
    - Currently 1, 3, 4 are allowed
- **DFPSC** = DL Frequency Partition Sub-band Count
  - Determines number of sub-bands in the non-zero partitions
- **DCASsb,0** = Number of Sub-band CRUs in FP0 (units are sub-bands)
  - Signaled explicitly in SFH
- **DCASmb,0** = Determines Number of Mini-band CRUs in FP0
  - Signaled in SFH: table-lookup is used (Tables 774-776)
- **DCASi** = Number of allocated CRUs (SB- and MB-) in the non-zero partitions (units are sub-bands)

Configuring the PHY for Maximum Number of Sub-band LRUs for one Frequency Partition (10MHz)

- 10MHz → 48 PRUs → Maximum of 12 Sub-bands
- DSAC=10 → Sets the number of Sub-bands to be 10 (the maximum allowed according to Table 769)
- DFPC = 0 → One Frequency Partition (Table 772)
- DFPSC = 0 → No subbands in non-zero partitions
- DCASsb0 = 10 → Number of sub-band CRUs in FP0 set equal to the total number of sub-bands
- DCASmb0 = 0 → No mini-band CRUs in FP0
- DCASi = 0 → No CRUs in non-zero partitions

PHY Structure with maximum allowed number of SLRUs in 10MHz, FPCT=1

- UMi /InH configuration
- The A-MAP is confined to the DRUs
- **Frequency Diversity order is essentially 2**
  - Need diversity order higher than 2!
- The same problem occurs on the UL for the mini-tile-based DLRUs
- How to fix?

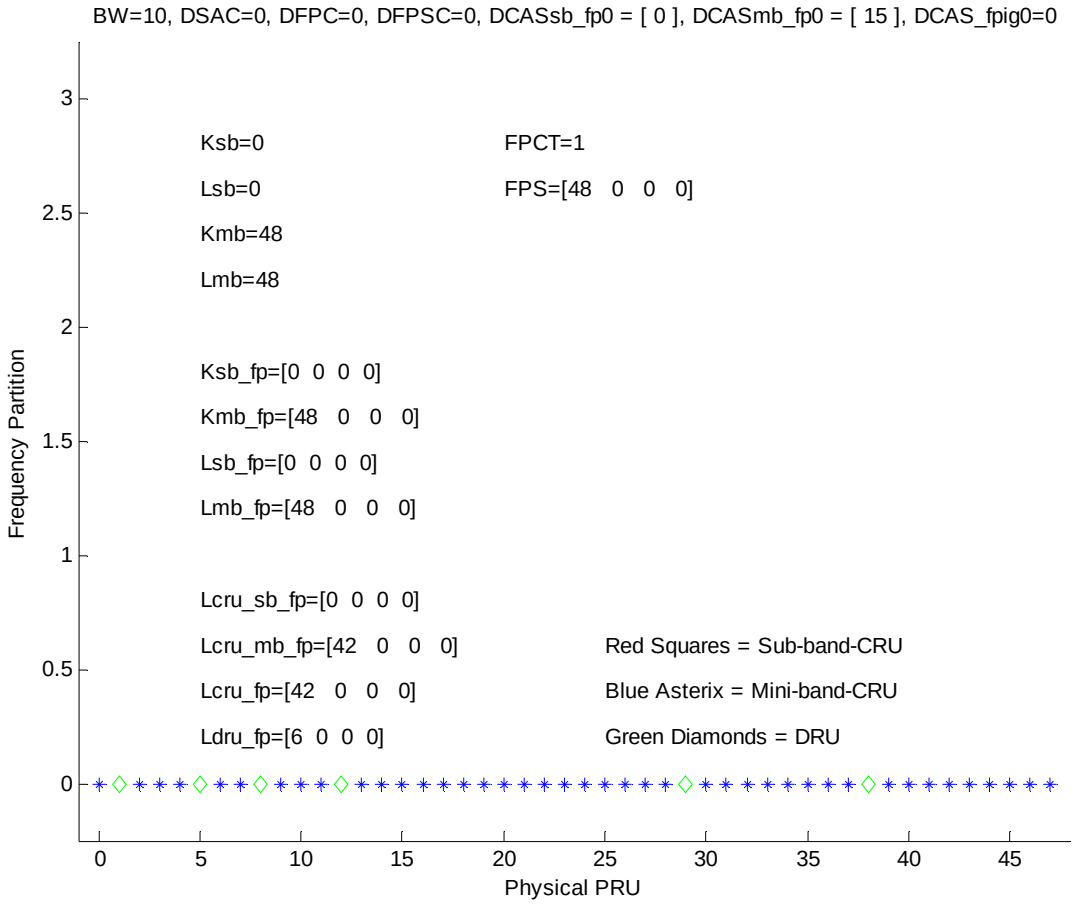


Configuring the PHY for Maximum Number of Mini-Band CRUs for one Frequency Partition (10MHz)

- 10MHz → 48 PRUs → Maximum of 12 Sub-bands
- DSAC=0 → Sets the number of Sub-bands to be 0
- DFPC = 0 → One Frequency Partition (Table 772)
- DFPSC = 0 → No Sub-bands in non-zero partitions
- DCASsb0 = 0 → Number of sub-band CRUs in FP0
- DCASmb0 = 15 → 42 mini-band CRUs in FP0 (Table 775) (the remaining 6 are DRUs)
- DCASi = 0 → No CRUs in non-zero partitions

Example – 10MHz
Maximum allowed number of NLRUs

- UMa / RMa Configuration
- One Frequency Partition
- DRUs are distributed across the bandwidth
  - OK for Diversity



Proposed Text

- Need a harmonized solution to this problem!