UL Control Structure for IEEE 802.16m Systems

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Discussion and adoption for 802.16m SDD

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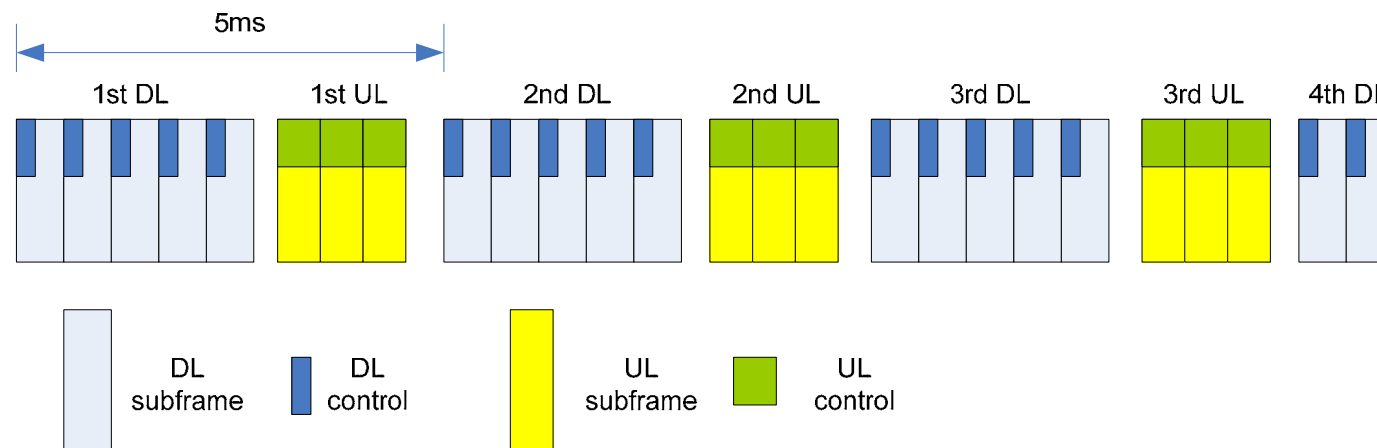<http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and <http://standards.ieee.org/guides/opman/sect6.html#6.3>.

Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and <http://standards.ieee.org/board/pat >.

Outline

- Proposed uplink control channel structure for IEEE 802.16m systems

- The feedback channel for 802.16m System

- The ACK channel for 802.16m System

- Proposed Sections/Subsections in the System Description Document (SDD)

# Uplink control channel structure for IEEE 802.16m systems

- ## Uplink control channel information
  - The uplink control channel includes the ranging channel, the ACK channel, the feedback channel, and etc. The ranging channel is covered in other document [C80216m-08_448]. And here we discuss about the ACK channel and the feedback channel.

- ## Uplink control channel structure
  - The uplink control channel is on a subframe basis. The control channel is multiplexed with data channel in same subframe in a FDM fashion. The resource between feedback channel and ACK channel may be shared if they are transmitted simultaneously.

5ms

1st DL   1st UL   2nd DL   2nd UL   3rd DL   3rd UL   4th DL

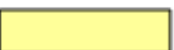DL subframe   DL control   UL subframe   UL control

Uplink control channel structure for IEEE 802.16m systems (Cont'd)

- Uplink control channel structure
  - The uplink control channel consists of several feedback channel blocks and several ACK channel blocks. The block carries multiple control channels in CDM fashion.

  - The feedback channel block is divided into several (recommendation: 6) distributed tiles and the ACK channel block is divided into several (recommendation: 2) distributed tiles.

  - A tile consists of 6 contiguous subcarriers by 3 OFDM symbols and the number of tile is same between first 3 symbols and other 3 symbols.

  - There is a figure about the control channel structure and the tile structure. All control channels in a block are multiplexed by the orthogonal codes as the tile of the figure and the maximum number of the channels depends on the number of the codes.

Uplink control channel structure for IEEE 802.16m systems (Cont'd)
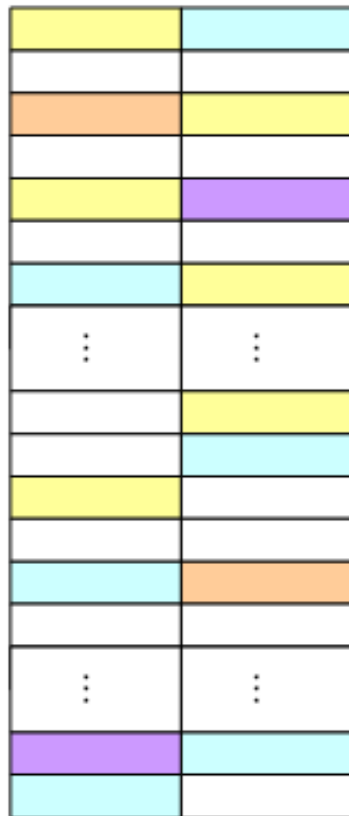
6 x ▯ = Feedback block #0

6 x ▯ = Feedback block #1

2 x ▯ = ACK block #0

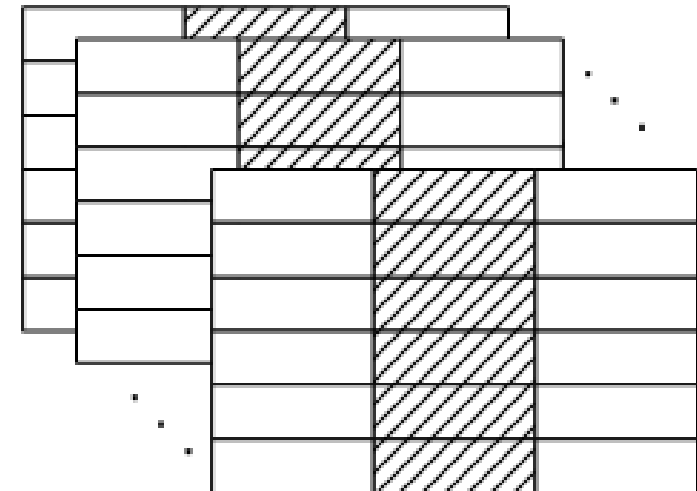2 x ▯ = ACK block #1

▯ Tile (6 subcarriers by 3 symbols)

< Control channel structure In a UL subframe>

☐ Data subcarrier

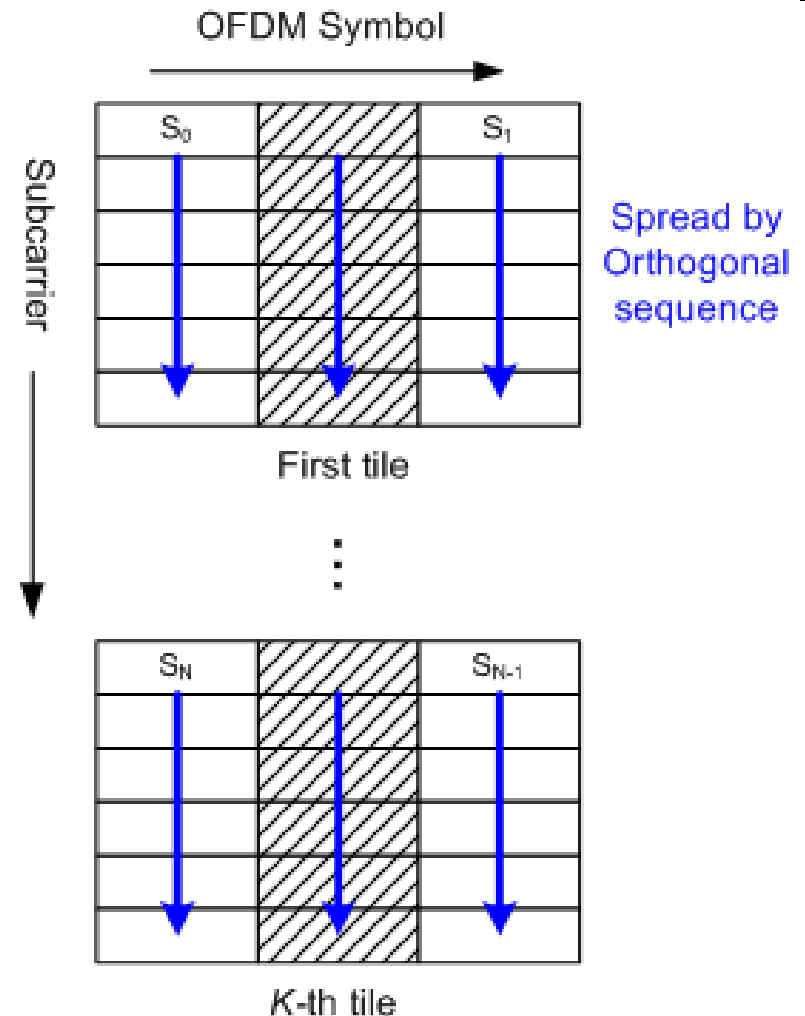▨ Pilot subcarrier

< A tile structure >

The feedback channel for 802.16m System

- ## The feedback channel information
  - Feedback Channel State Information (CSI) or Channel Quality Information (CQI)
  - Best subband indication for AMC
  - MIMO related information such as Rank information, codebook index
  - Etc.

- ## The feedback channel structure
  - The feedback channel has several feedback channel blocks in FDM and the block consisted of several distributed tiles. The feedback channel of a block carries several feedback channels in CDM.

- ## The feedback channel indication method
  - BS indicates to MS the block index of the feedback channel and the code index of the block.

The feedback channel (Cont'd)

- The feedback information to the feedback channel mapping procedure

  – The information is coded to the coded and modulated signal. The coding and modulation method is FFS.

  – The signal is divided into the number of tiles in a block.

  – The divided signal is spreaded to subcarriers of each tile by orthogonal code which BS allocate the code index as the figure in next slide.


OFDM Symbol

Subcarrier

S_0 S_1

Spread by Orthogonal sequence

First tile

S_N S_{N-1}

K-th tile

The ACK channel for 802.16m System

- ## The ACK channel information
  - ACK or NACK (or DTX if needed) for DL HARQ burst. If it is needed (ex. MCW), the MS transmits one or more ACK channel in a subframe.
  - NACK for DL broadcast burst
  - If ACK information is transmitted with the feedback data, the information can carry in the feedback channel.

- ## The ACK channel structure
  - The ACK channel has several feedback channel blocks in FDM and the block consisted of several distributed tiles. The ACK channel of a block carries several feedback channels in CDM.

- ## The ACK channel indication methods
  1. BS indicates the block index of ACK channel and the code index in the block directly through DL control channel to each MS as same method of CQICH.
  2. MS determines index of HARQ ACK channel in an pre-determined mapping way. For example, the default location of ACK channel is allocated per DL Resource unit.

The ACK channel (Cont'd)

- **The ACK information to the ACK channel mapping procedure**

  - The information is repeated (if it is one bit) or coded (if it is more than one bits) to the coded and modulated signal.

  - The signal is divided into the number of tiles in a block.

  - The divided signal is spreaded to subcarriers of each tile by orthogonal code which BS allocate the code index as the figure in next slide or the code is pre-determined.
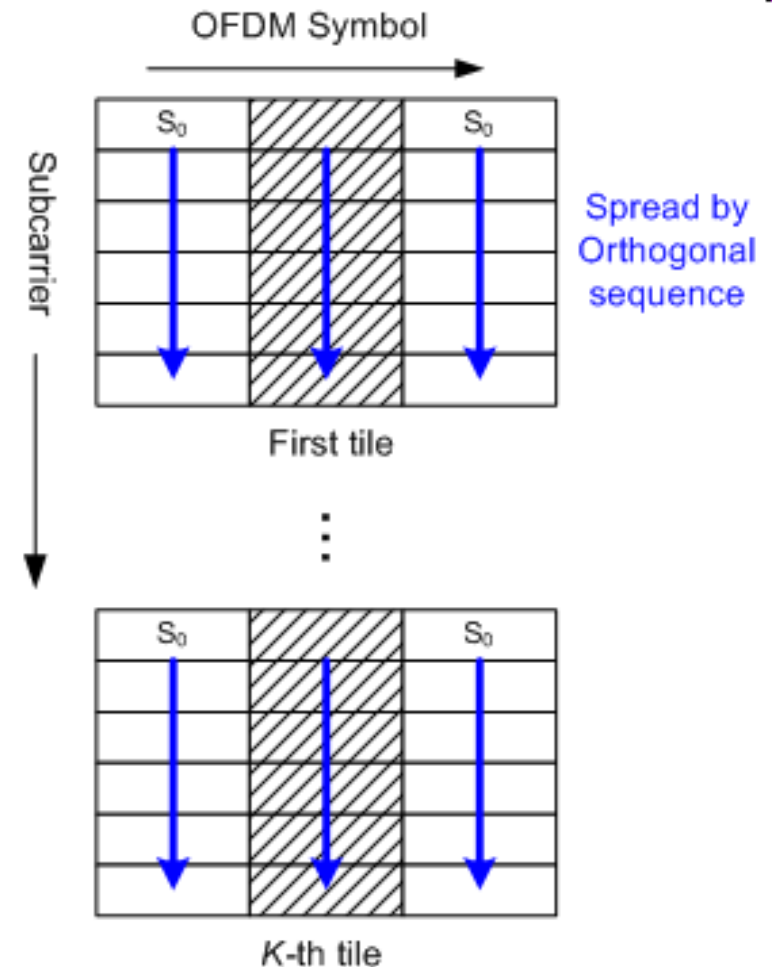
Proposed Sections/Subsections in the SDD

-------------------- *Start of the Text* --------------------------------

11. Physical Layer

    11.x Uplink control structure

        [Insert the text in page 3, 4]

        11.x.1 CQICH

            [Insert the text in page 6, 7]

        11.x.2 ACKCH

            [Insert the text in page 8, 9]

        11.x.3 Bandwidth request

            [FFS]

-------------------- *End of the Text* --------------------------------