IEEE 802.16m Uplink Resource Blocks and Pilot

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Venue:

TGm – Call for contributions on Project 802.16m System Description Document – IEEE 802.16m-08/016r1
(Uplink Physical Allocation Unit)
(Uplink Pilot Structures)

Base Contribution:

IEEE C802.16m-08/271

Abstract:

Proposal for 16m uplink resource allocation unit and pilot structure.

Purpose:

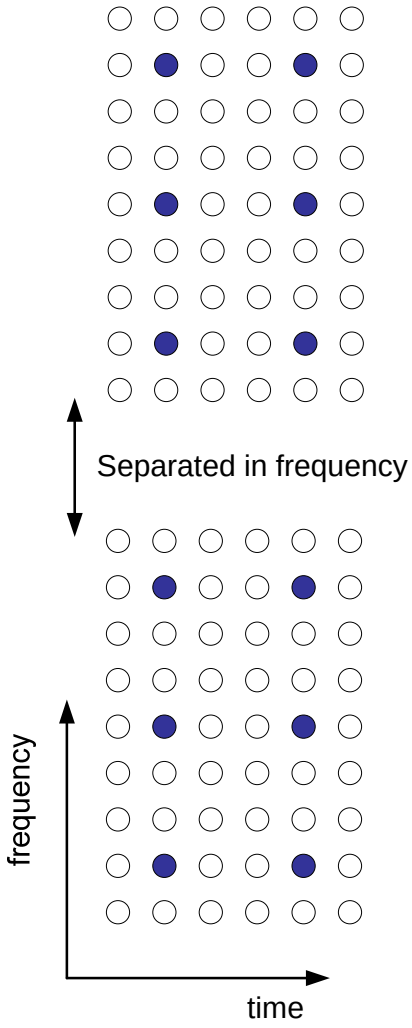
Adoption of proposed text/content for 802.16m System Description Document

Considerations on UL Resource Block

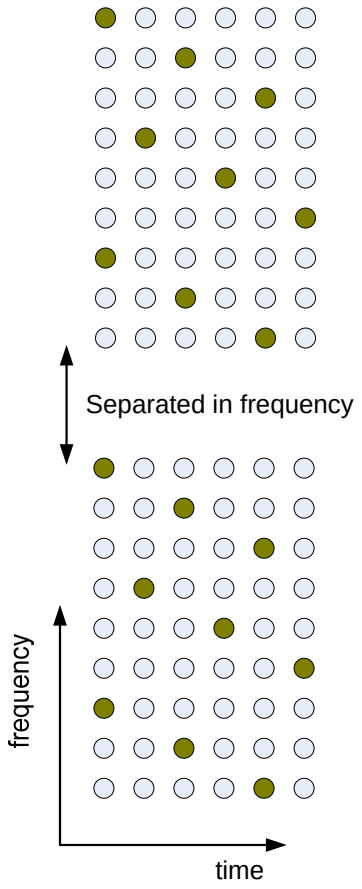
- Slot (logic resource unit) is 18 subcarriers by 6 OFDM symbols
  - Minimum resource allocation unit
  - Same as DL
- There are multiple tiles within a slot
  - Small tile size
    - Better frequency/time diversity for small payload
    - Worse channel estimation performance
  - Large tile size
    - Worse frequency/time diversity for small payload
    - Better channel estimation performance
- SDMA considerations
  - CDM pilots between SDMA users may reduce overhead

Proposed UL Resource Block and Pilot Pattern

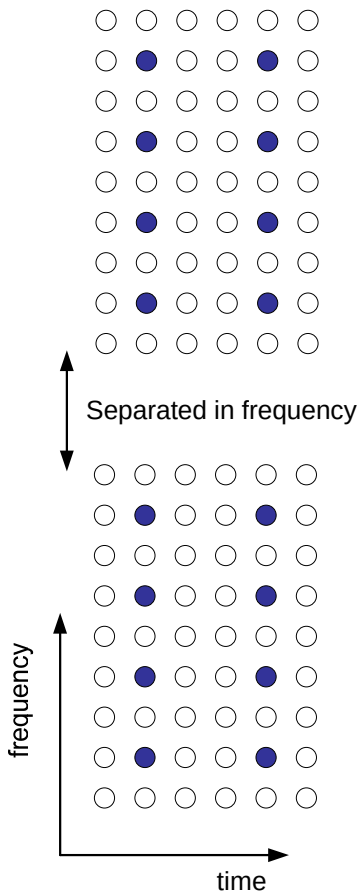
- Tile size is 9 subcarriers by 6 OFDM symbols
  - With 40 bytes payload, 16-QAM, ½ coding → 2 slots, or 4 tiles
- In distributed mode, two tiles of a slot are separated in frequency
- In localized mode, two tiles of a slot are contiguous in frequency
- Pilot overhead 11.1%
  - WiMAX B-AMC → 11.1%
  - WiMAX PUSC → 33.3%
  - LTE → 14.3%
- Link simulations show acceptable channel estimation performance, with least pilot overhead



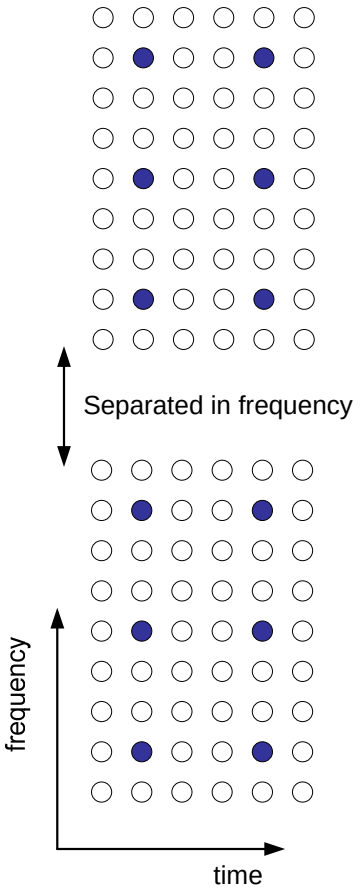
Link Simulations (Slot Structures)



Slot B1: two tiles
9x6, P=9,
OH=16.7%



Slot B2: two tiles
9x6, P=8,
OH=14.8%

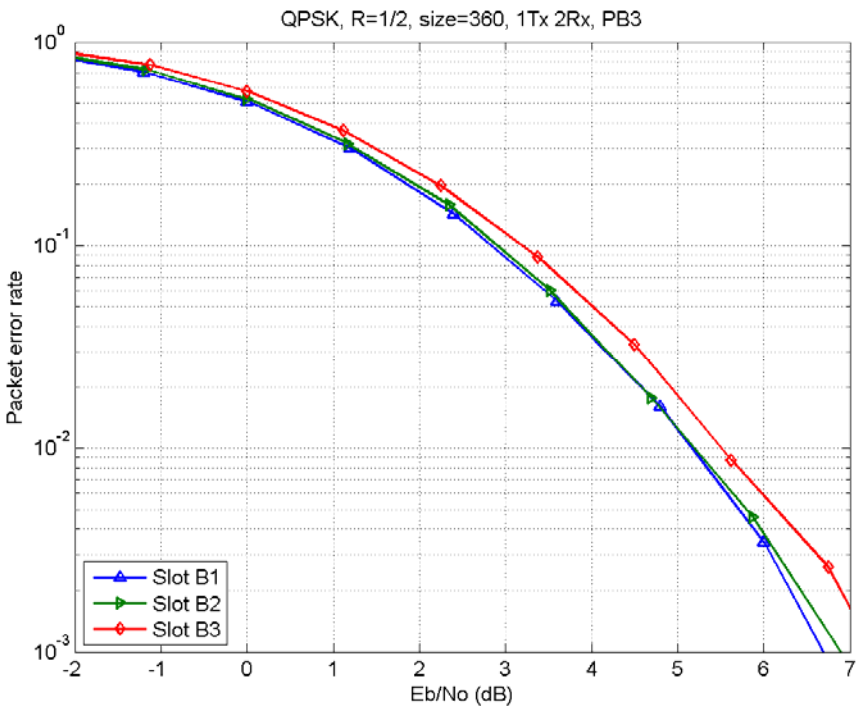


Slot B3: two tiles
9x6, P=6,
OH=11.1%

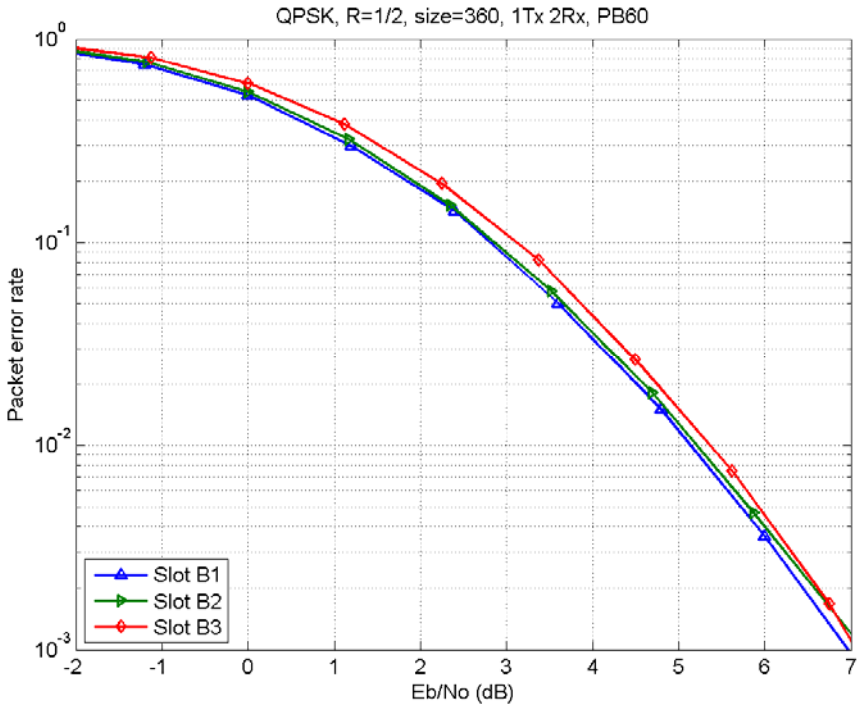
Link Simulation Assumptions

- WiMAX numerology with 10 MHz bandwidth
- OFDM waveform with frequency hopping between subframes (6 OFDM symbols)
- Resource allocation:
  - For QPSK, r=1/2 (MPR=1), use 4 slots over 4 subframes
  - For 16QAM, r=1/2 (MPR=2), use 2 slots over 2 subframes
- 802.16e CTC encoder
- 1Tx antenna at MS
- 2Rx antennas at BS
- MMSE 2D channel estimation per tile
- Channel model: Ped-B 3kmph, 60kmph

Link Simulation Results (QPSK)



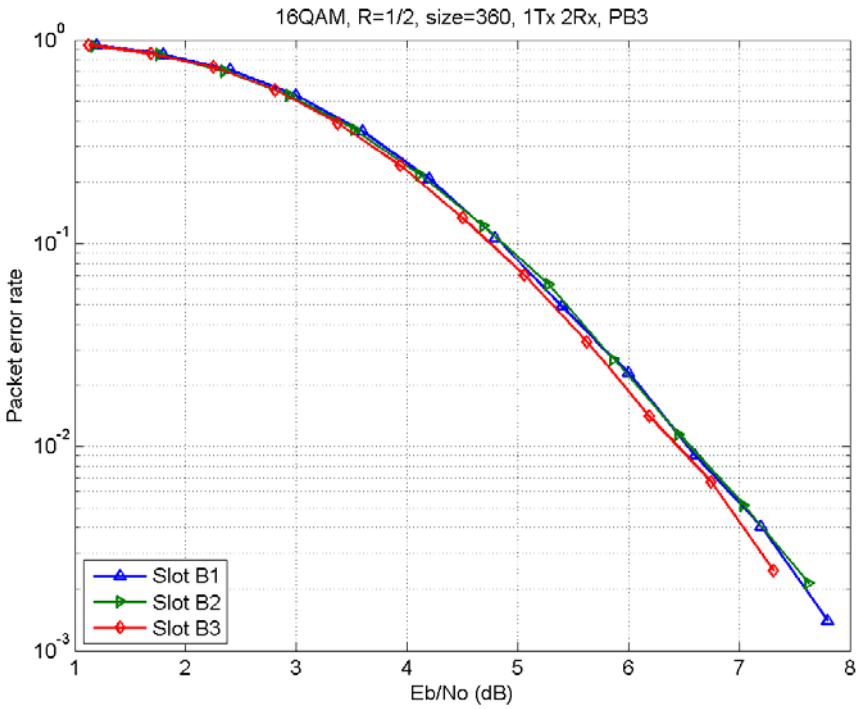
QPSK, rate 1/2, PB3



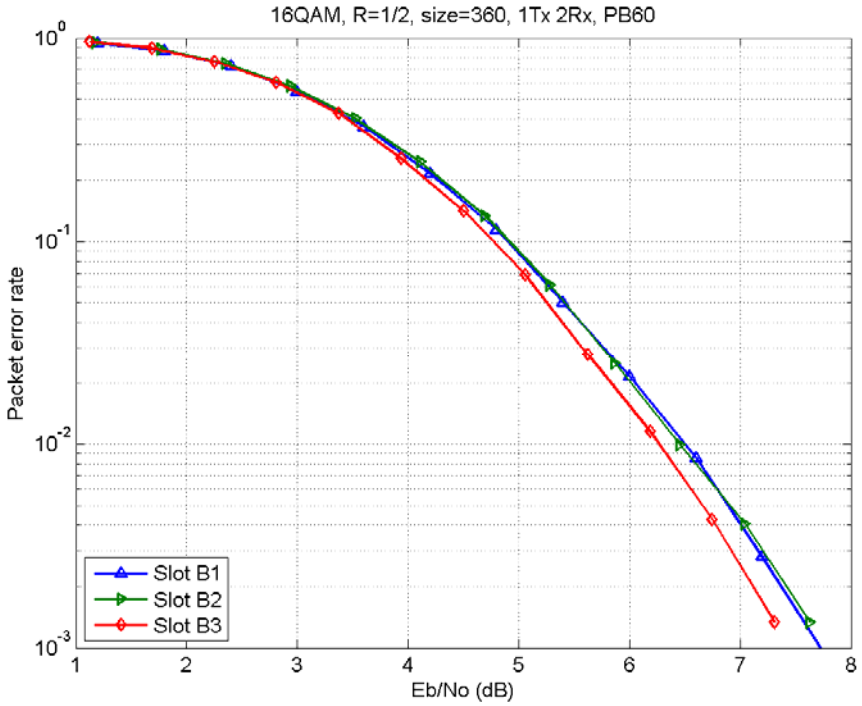
QPSK, rate 1/2, PB60

- Slot B3 has similar link performance as B1 & B2
- Slot B3 has least pilot overhead

Link Simulation Results (16-QAM)



16QAM, rate 1/2, PB3



16QAM, rate 1/2, PB60

- Slot B3 has slight better performance than B1 & B2, due to pilot power
- Slot B3 has least pilot overhead