

# Protection Region for Exclusion Bands for EPoC upstream

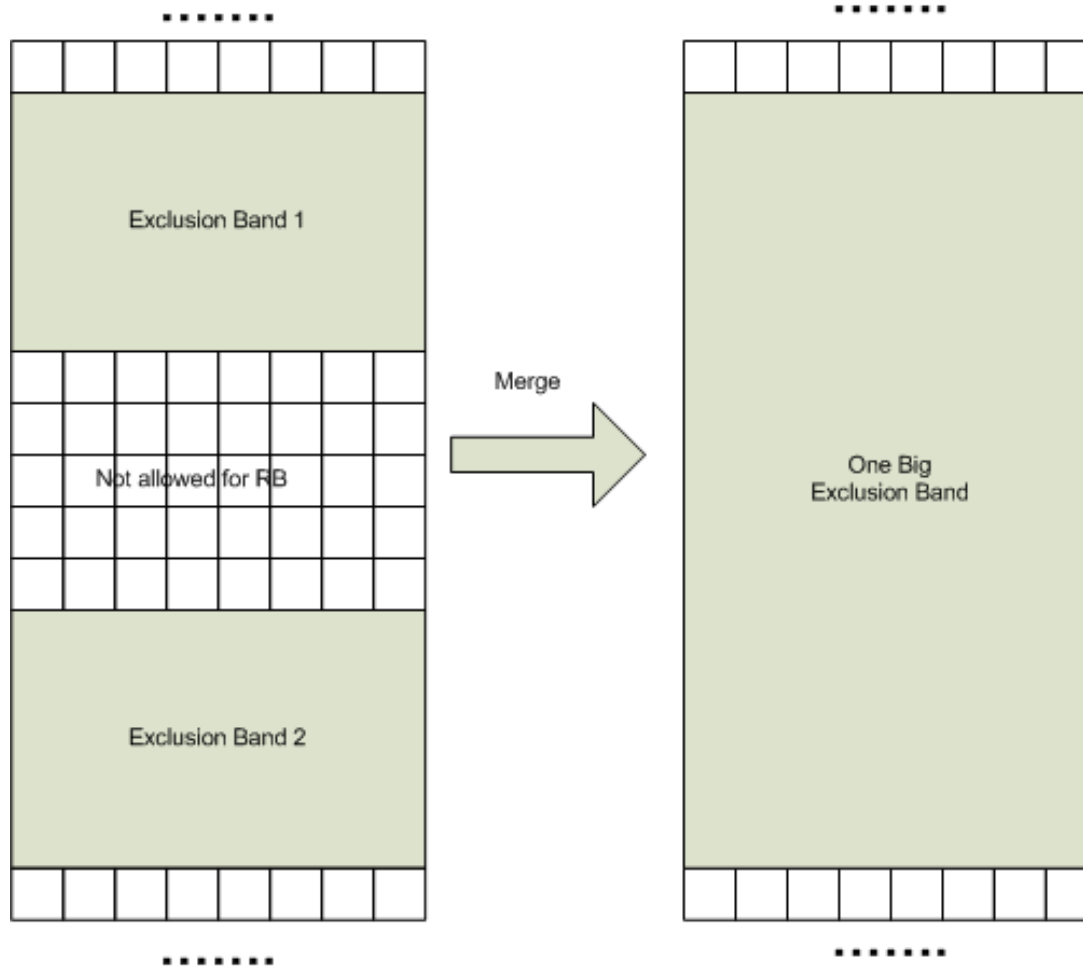
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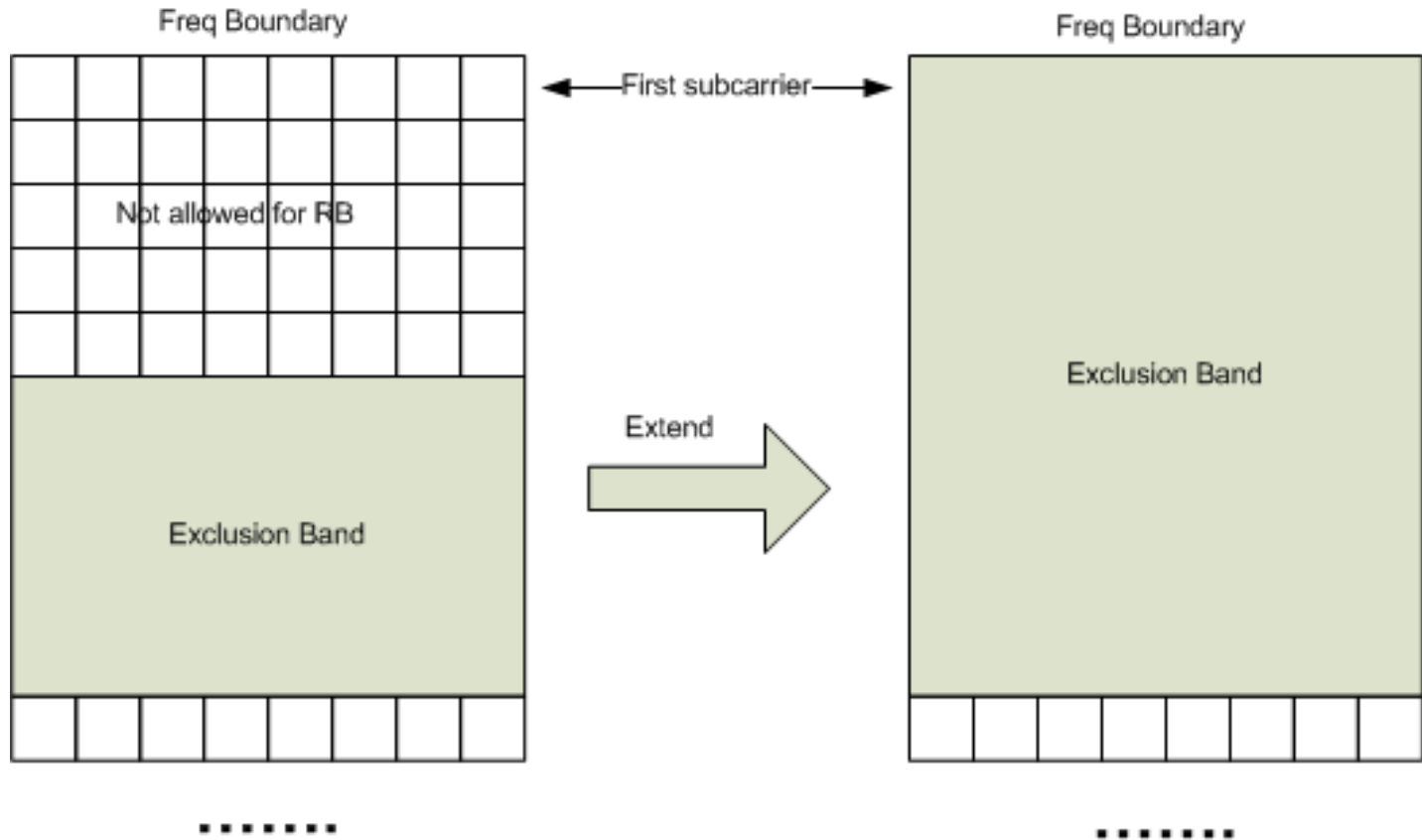
# Exclusions in the pilot proposal

- A minimum of eight contiguous used subcarriers are required between exclusion bands and between exclusions and the first or the last subcarriers of the OFDMA frame
- RBs must not be allocated to subcarriers between exclusions that are less than 8 subcarriers to the subcarriers between exclusions If the gap in frequency between these exclusion bands is less than 8 subcarriers wide
- RBs must not be allocated to subcarriers between an exclusion band and the first subcarrier of the OFDMA spectrum if there are less than 8 subcarriers between them
- RBs must not be allocated to subcarriers between an exclusion band and the last subcarrier of the OFDMA spectrum if there are less than 8 subcarriers between them

# What does that mean?



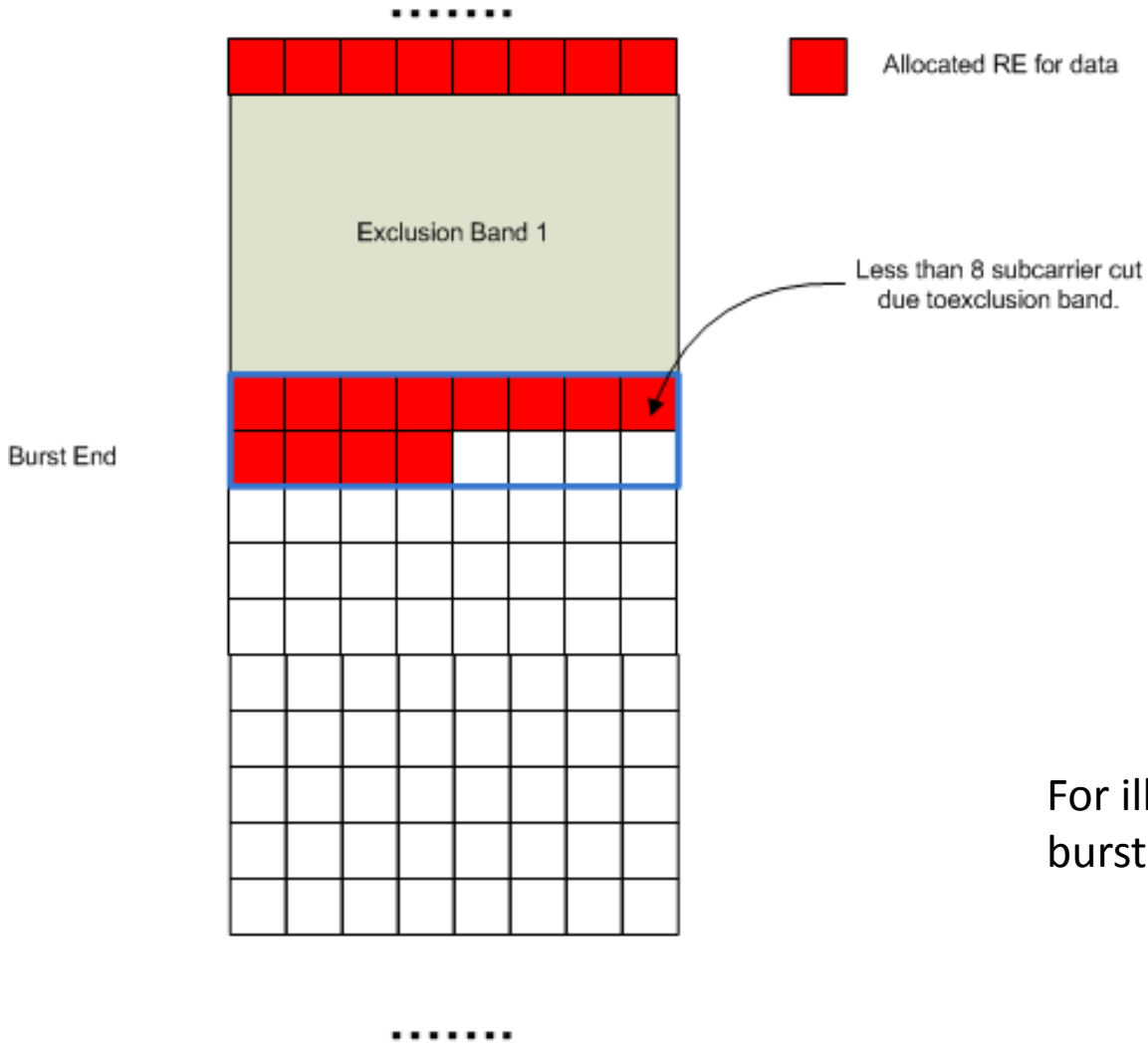
# For OFDM Frequency Boundary



# Questions

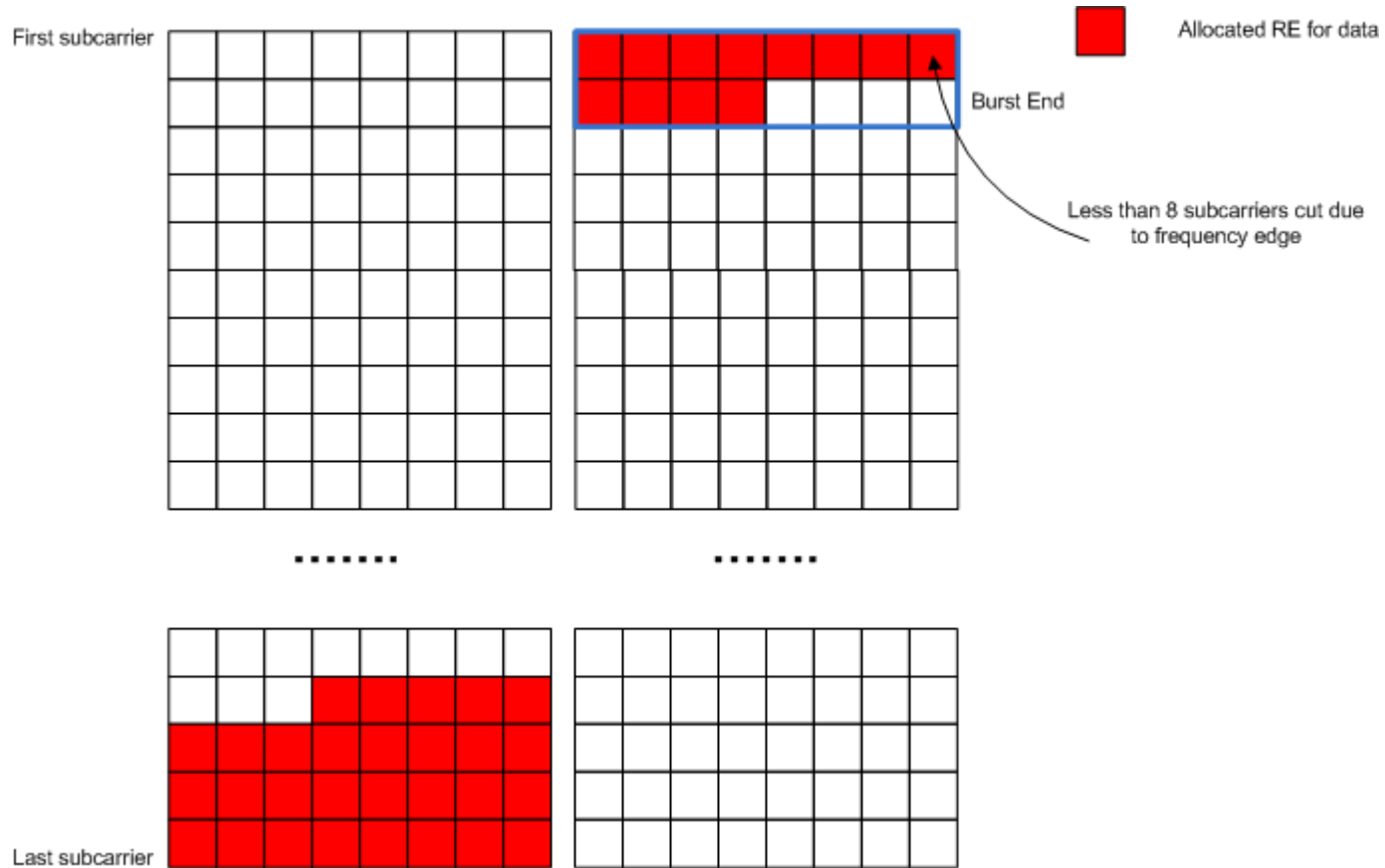
- The exclusion rules in the proposal can avoid having a chunk of less than 8 contiguous subcarriers in the middle of a burst or at the frequency boundary .
- But the exclusion rule cannot avoid having a chunk of less than 8 contiguous subcarriers at the start or end of the burst.
- The exclusion bands may cut one burst into several pieces, and the start or end piece may have less than 8 contiguous subcarriers
- Assume that a piece of burst with less than 8 contiguous subcarriers cannot meet the performance requirement.

# Exclusion band cuts burst into pieces



For illustration only. Omit burst markers and pilots

# Burst Cut by Frequency Edge

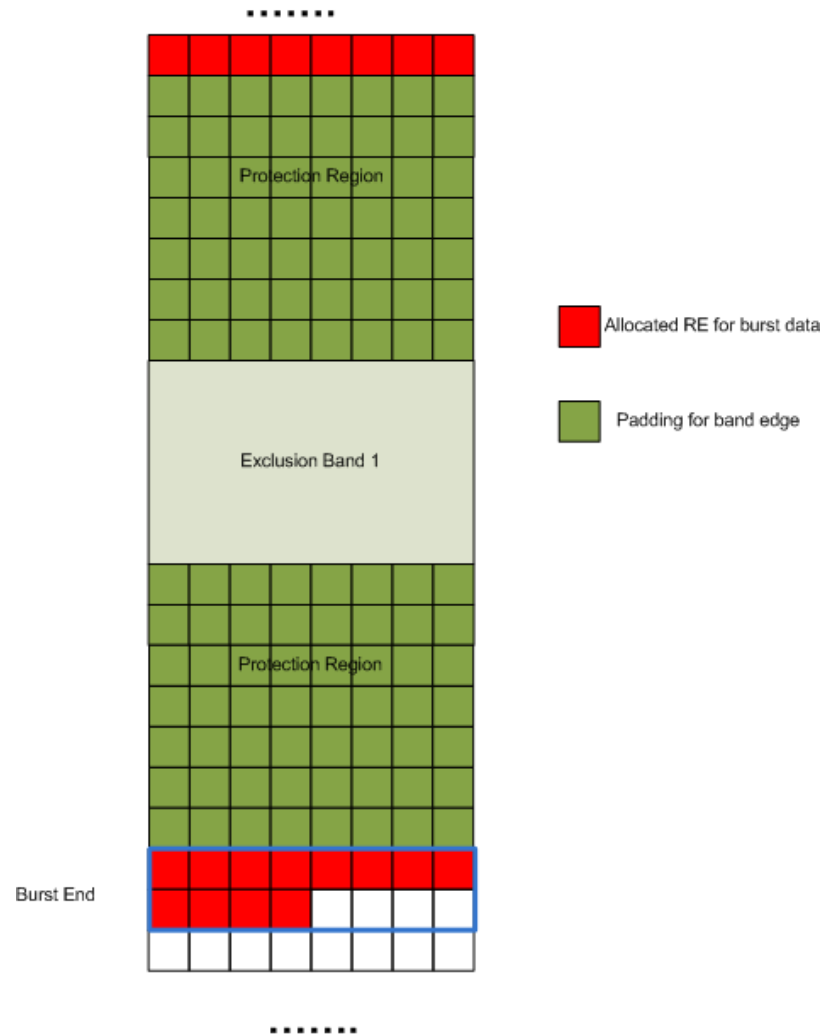


# Possible Solutions

- Shift burst along the frequency?
  - Cause additional jitters.
- Padding data at the start or end of burst?
  - Need to find a means to indicate such padding bits.
  - Still cannot avoid jitter is padding at the start of a burst.
- A simple solution: Padding along the exclusion band edges or freq edges:
  - Padding the 7 subcarriers next to each exclusion band edge and freq. edge with known PRBS sequence.
  - The CNU that sends the burst covering the protection region is responsible to send the padding bits.
  - Cost 14 subcarriers or 700kHz for both sides of exclusion band.
  - Cost 7 subcarriers or 350kHz for each frequency edge.

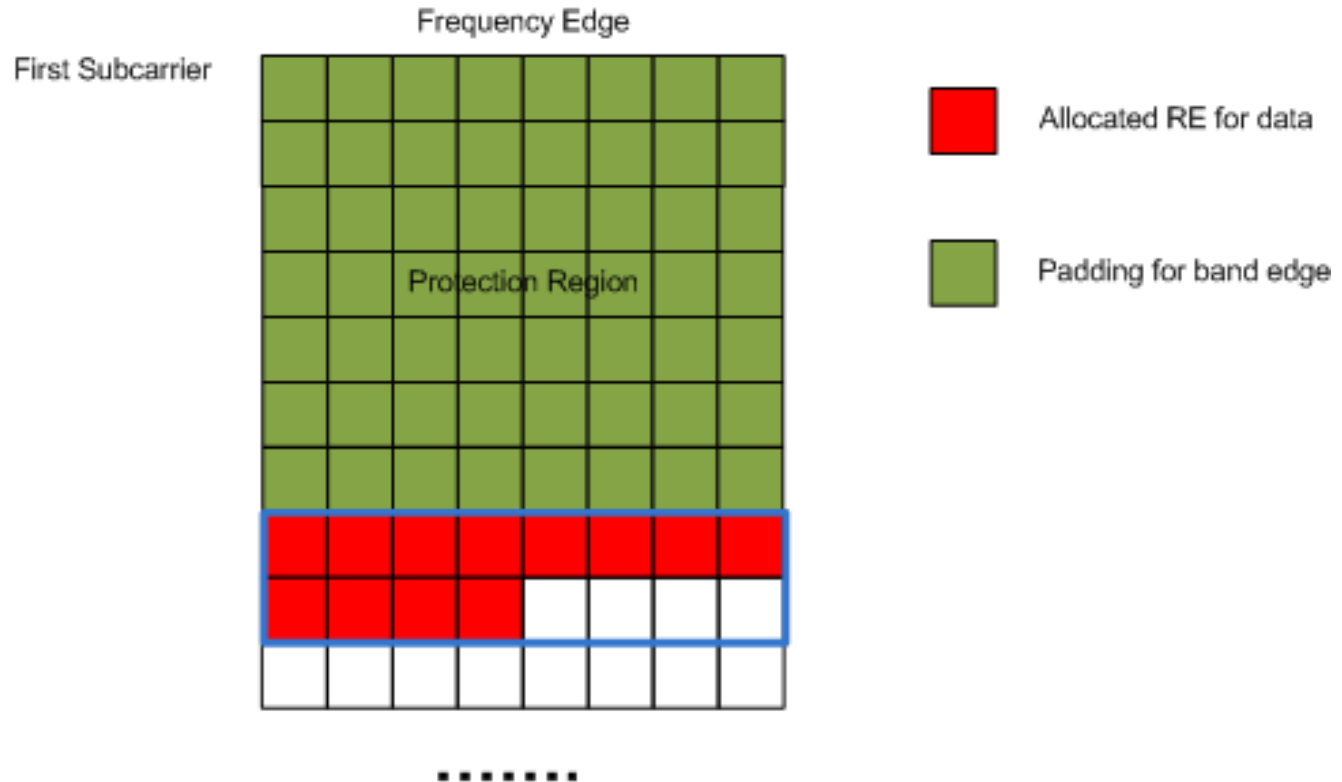


# Example of padding for band edge



For illustration only. Omit burst markers and pilots

# Example on the Frequency Start Boundary



# Other thoughts

- The padding along the exclusion band edges and frequency edges form a “protection region” for these edges.
- The PRBS sequence in the protection region helps the reception of the piece cut by the band edges
- Does not increase complexity for 1D-2D mapping
  - Protection regions are out of the mapping process just like exclusion bands.
  - All CNU's see the same protection regions
- Burst markers, pilots and data are not allowed to transmit in the protection region
- The size of protection region (in this talk, we use 7 subcarriers) can be set by CLT.