

Protection Region for Exclusion Bands for EPoC upstream

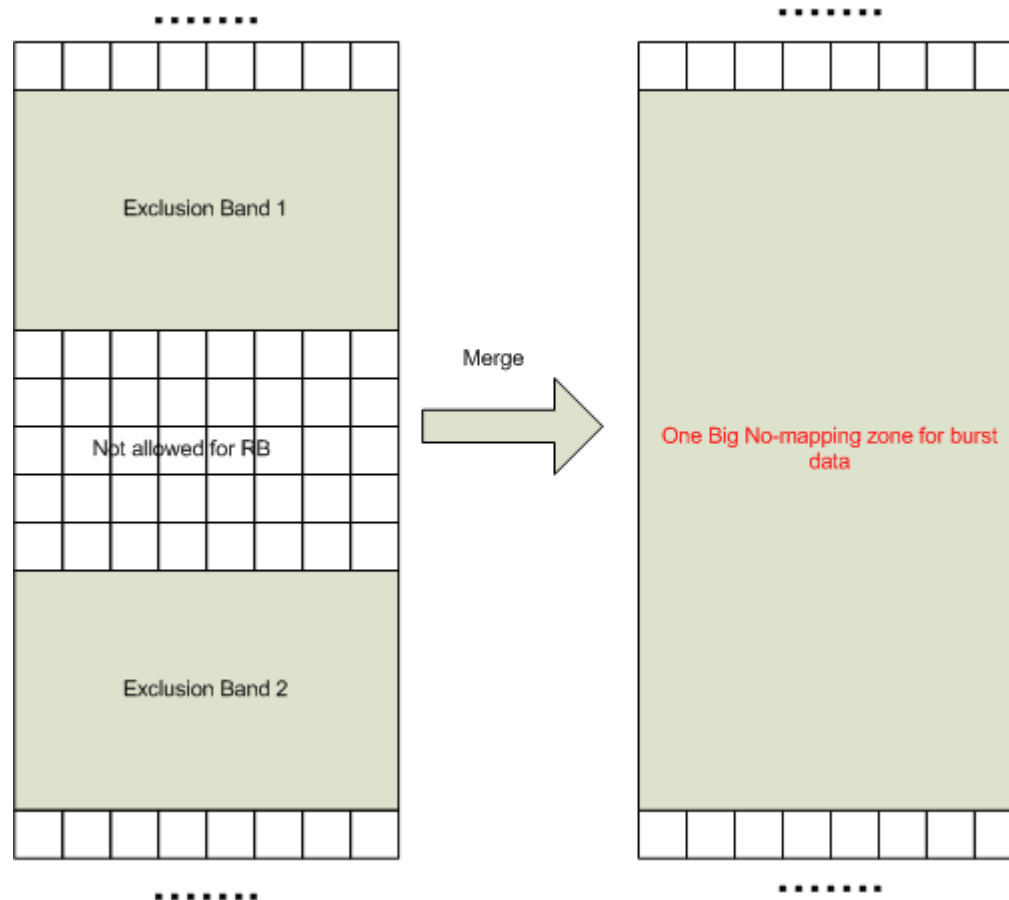
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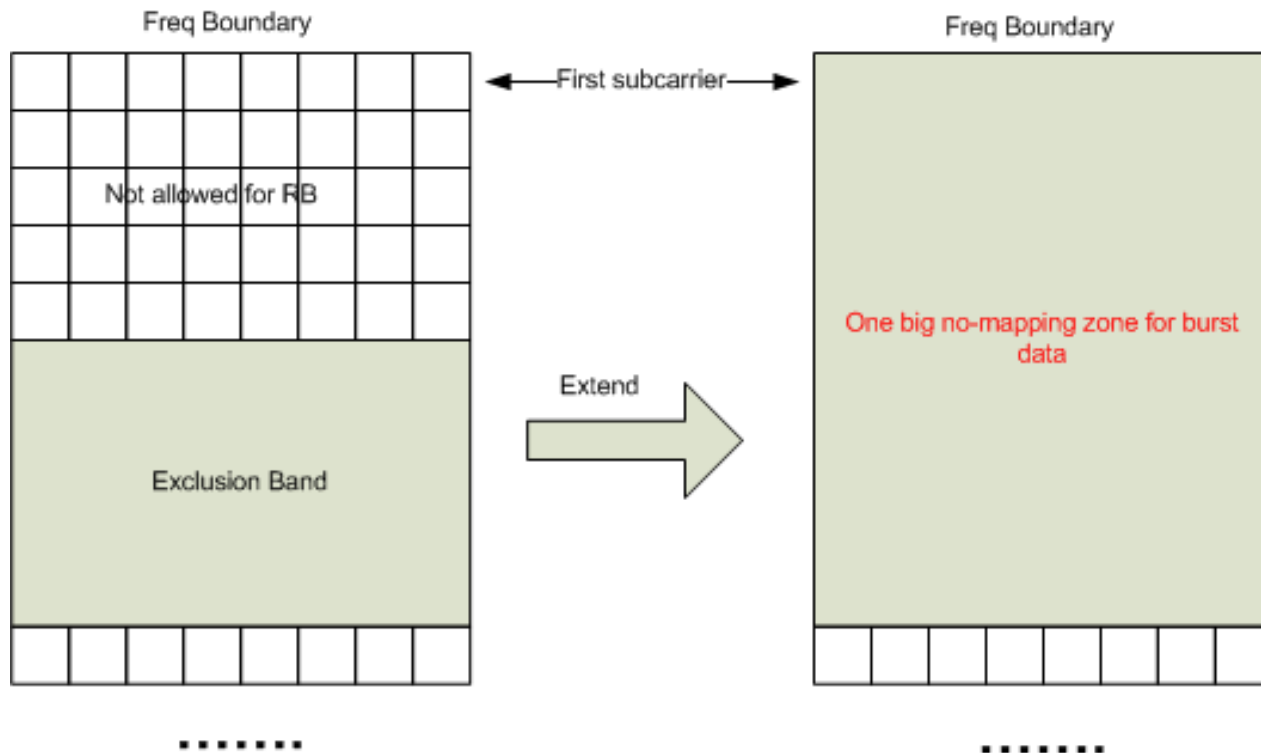
Exclusions in the pilot proposal

- 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?



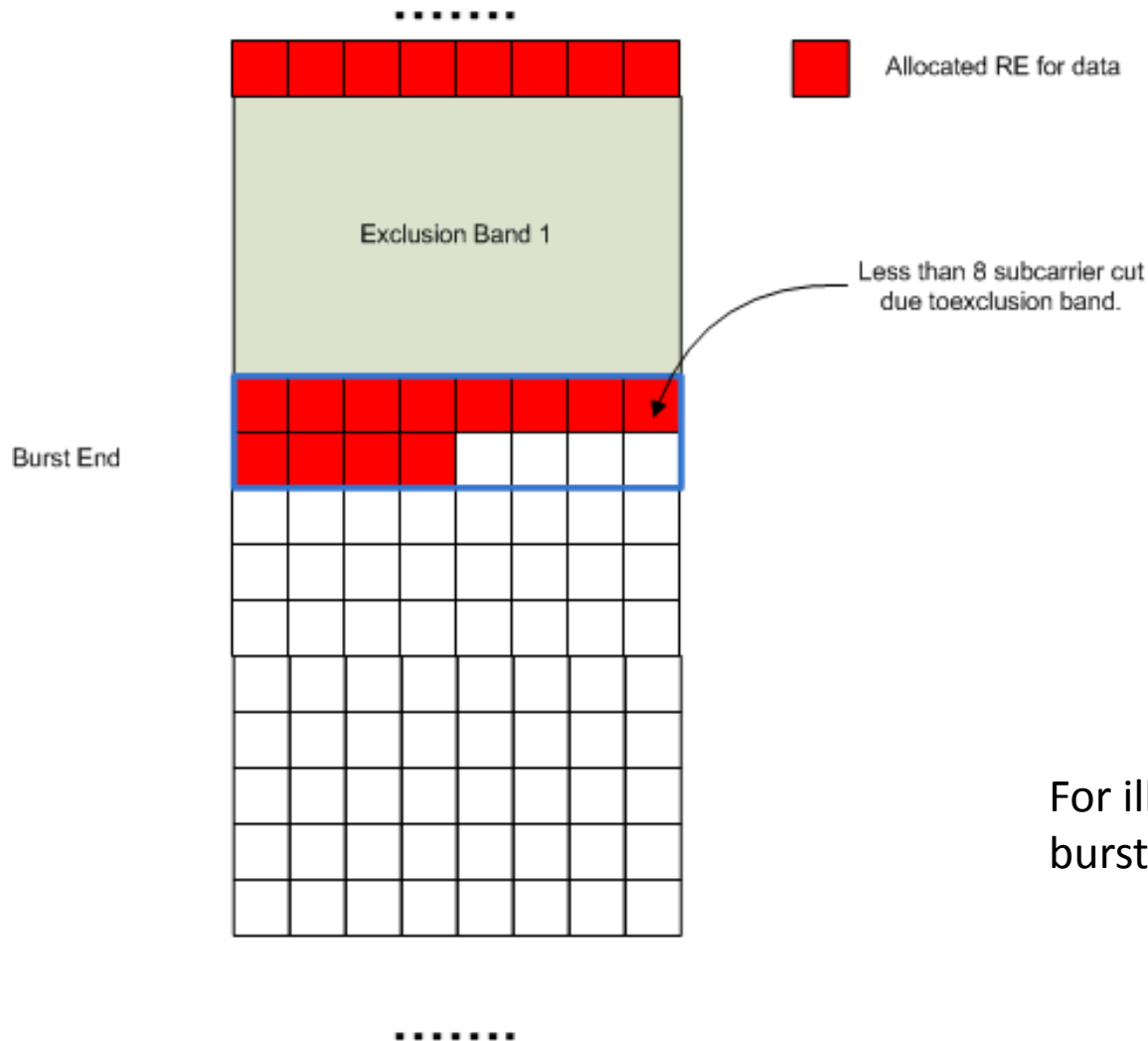
For OFDM Frequency Boundary



Questions

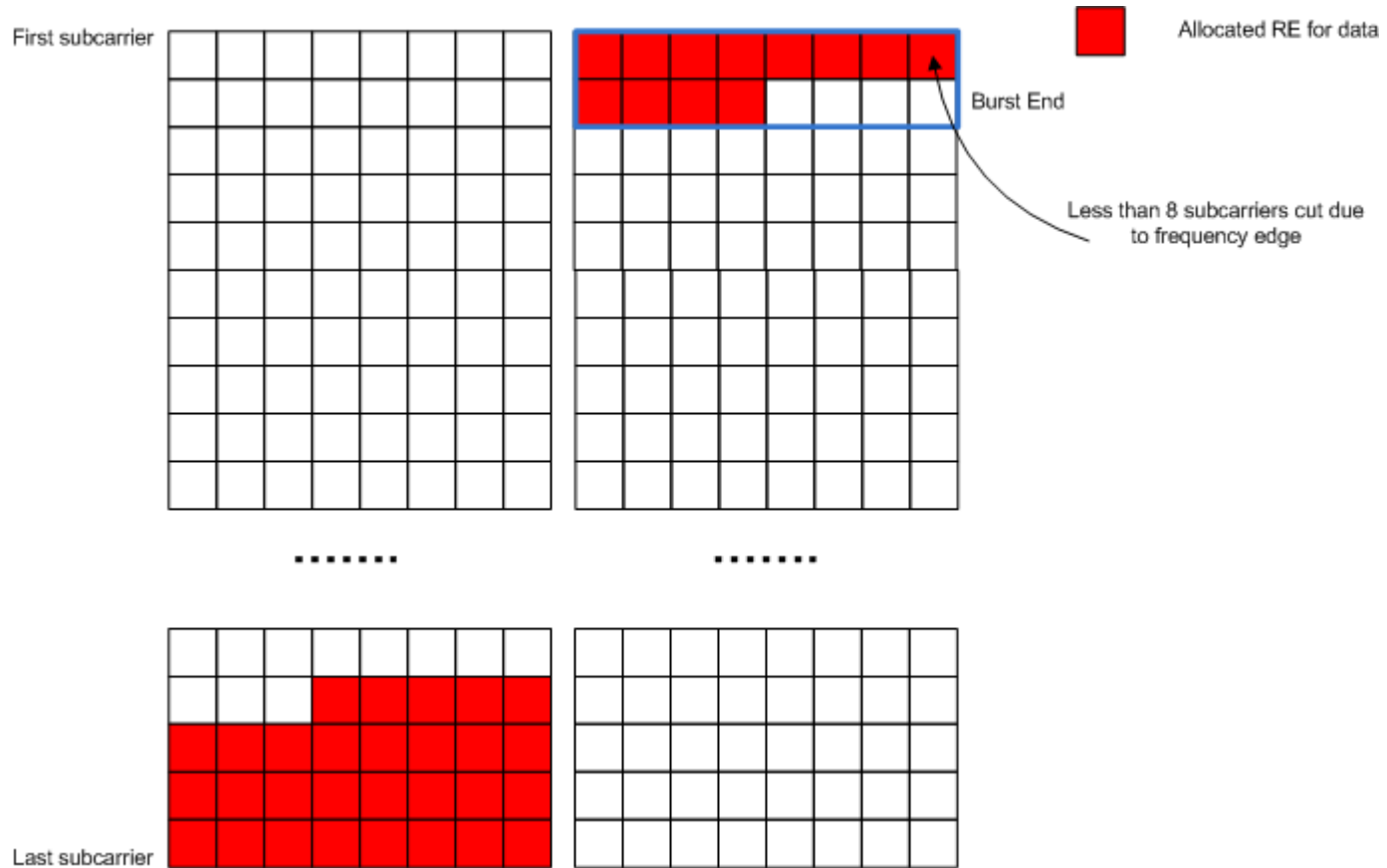
- The exclusion rules in the proposal can avoid having a chunk of less than 8 contiguous subcarriers in the middle of a burst or at the frequency boundary .
- But the exclusion rule cannot avoid having a chunk of less than 8 contiguous subcarriers at the start or end of the burst.
- The exclusion bands 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

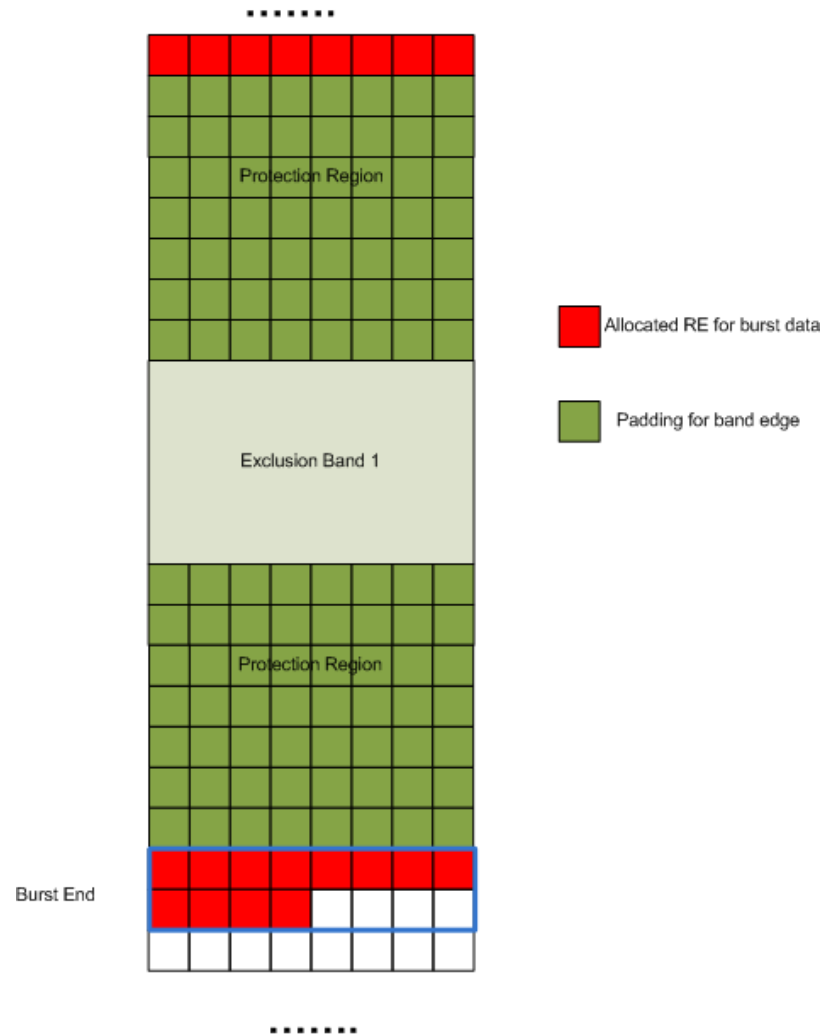
Burst Cut by Frequency Edge



Possible Solutions

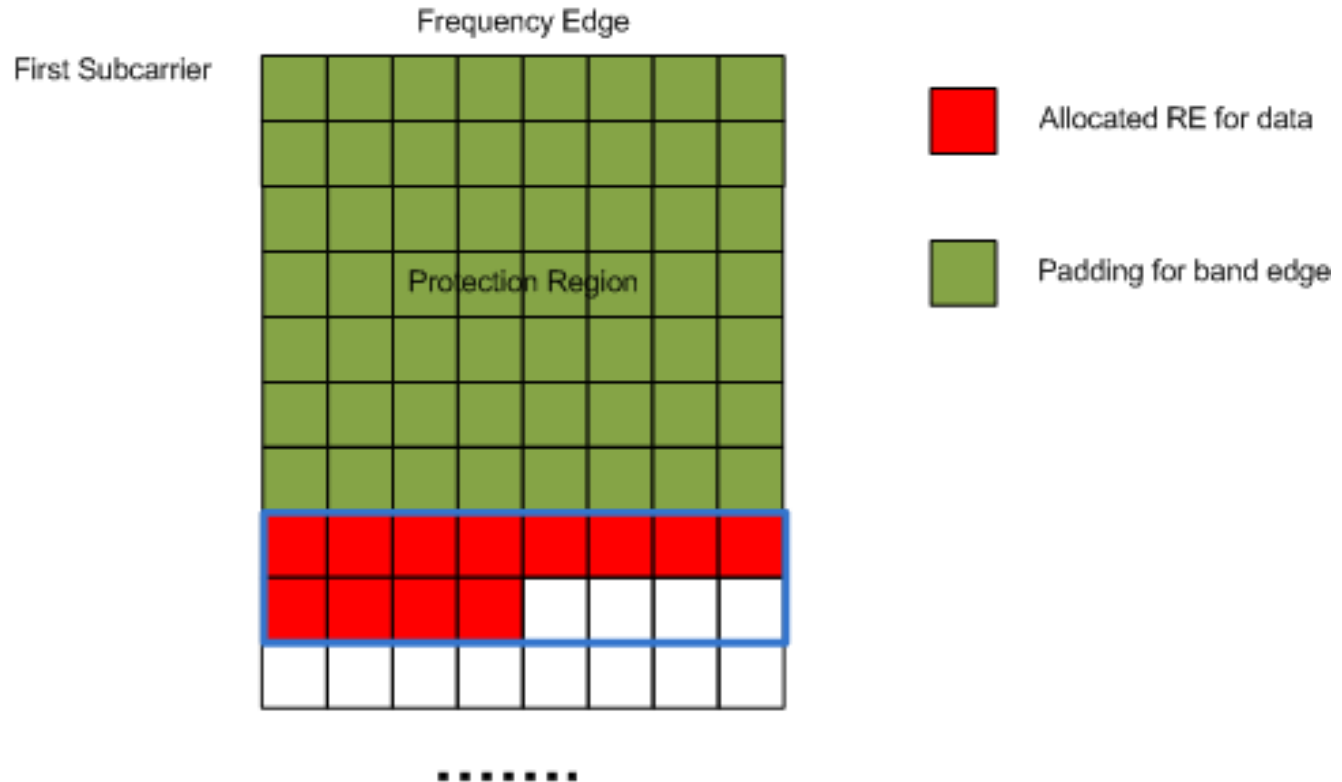
- Shift burst along the frequency?
 - Cause additional jitters.
- Padding data at the start or end of burst?
 - Need to find a means to indicate such padding bits.
 - Still cannot avoid jitter is padding at the start of a burst.
- A simple solution: Padding along the exclusion band edges or freq edges:
 - 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 CNUs 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.

Straw Poll

- The EPoC upstream transmission shall adopt the protection region (or other names of same concept) for exclusion bands and frequency edges, and MDIO registers shall be specified to program the size of protection regions. The padding sequence of protection regions is TBD.

Yes:

No:

Abstain: