Proposal for Constellation Re-arrangement in IR HARQ

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Venue:

   IEEE 802.16m-08/052, "Call for Comments on Project 802.16m System Description Document (SDD)",
   Target section: 11.13.2.2 Bit re-arrangement

Base Contribution:

   None

Purpose:

   To be discussed and adopted by TGm for use in 802.16m SDD

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Proposal for Constellation Re-arrangement in IR HARQ

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About This Contribution

- Goal and scope of this contribution
  - Propose a constellation re-arrangement operation in IR HARQ for 802.16m

- Issue to be addressed in this contribution
  - The result of Session #58 on HARQ operation
  - Potential problem of current constellation re-arrangement scheme
  - New constellation re-arrangement operation

Background

- In session #58, two comments #510 and #511 were accepted, but editor regarded they contradicted each other, decided to reflect #510 only.
  - Comment #510 (FAV: 52, OPP:46)
    - 11.13.2.2 Bit re-arrangement

      Bit re-arrangement (BitRe) is supported in 802.16m. Bit re-arrangement includes a bit-level interleaver and an inverter. For each transmitted burst, the BitRe-version is selected by the transmission number of this burst. The specific bit-level interleaver and invreter mechanism is FFS.
  - Comment #511 (FAV: 43, OPP:22)
    - 11.13.2.2 Constellation re-arrangement

      Constellation re-arrangement (Co-Re) is supported in 802.16m. All the QAM symbols in the same HARQ re-transmission use same Co-Re version. The specific selection mechanism is FFS.

- This contribution is an extension of Comment #511.

Current HARQ & CoRe operation

- Incremental redundancy (IR) is a mandatory Hybrid-ARQ (HARQ) operation for 802.16m
  - Chase Combining(CC) is a special case of IR HARQ
- Constellation re-arrangement (Co-Re) is supported in 802.16m. For each transmitted bit, the CoRe-version is selected by the transmission number of this bit. The specific selection mechanism is FFS.
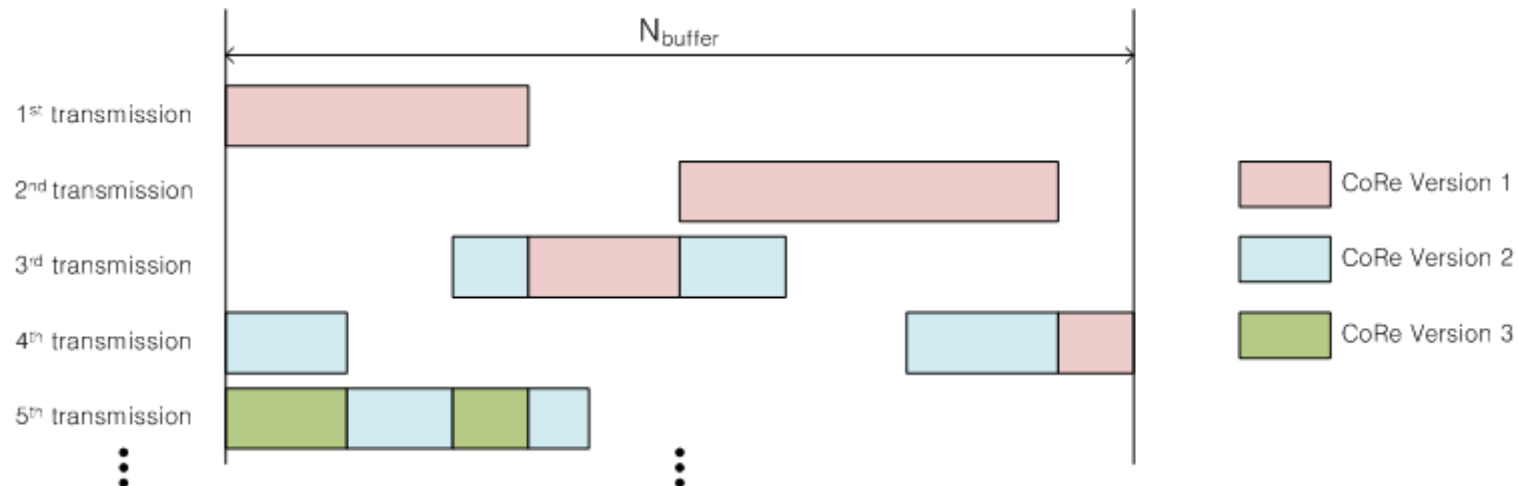
Problem of Current Co-Re Operation

- Current Co-Re operation has a problem in case of IR-HARQ and adaptive HARQ.
  - If the MAP is missing, the MS can't know the CoRe-version for each transmitted bit.
  - In IR and adaptive HARQ operation, this problem is critical.
  - For each transmitted symbol, the CoRe-version may be indicated, but the overhead is large.
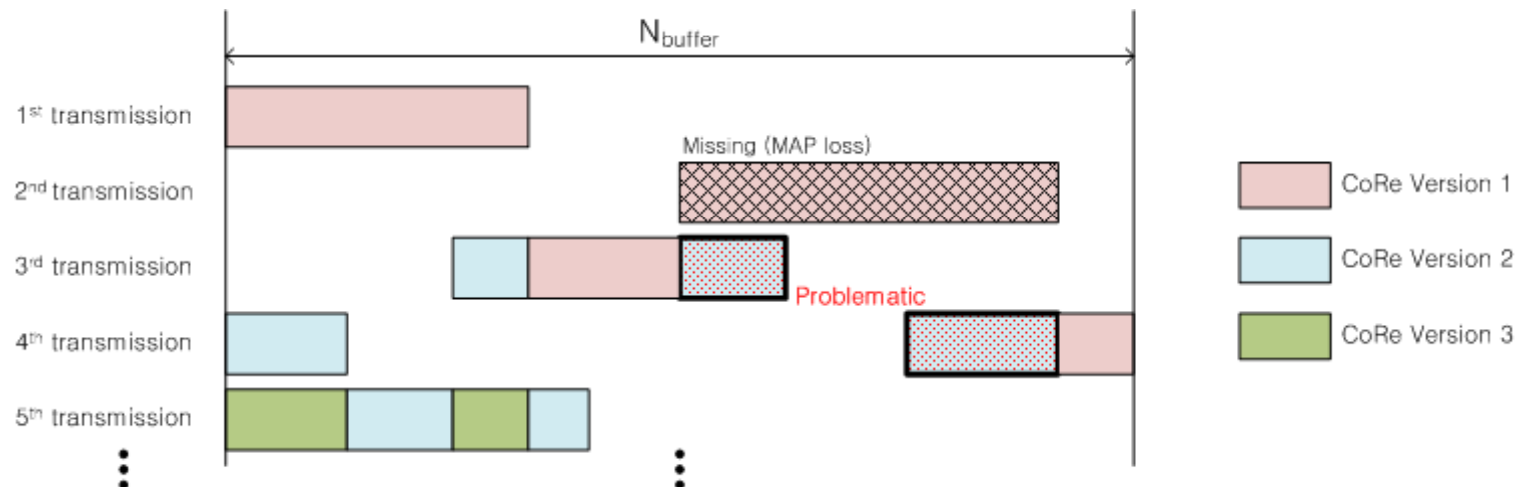
Proposed Co-Re Operation

- In the proposed scheme, all the modulated symbols in a HARQ re-transmission use same CoRe-version.
  - Robust Co-Re operation in case of MAP loss
  - Minimal overhead for CoRe operation
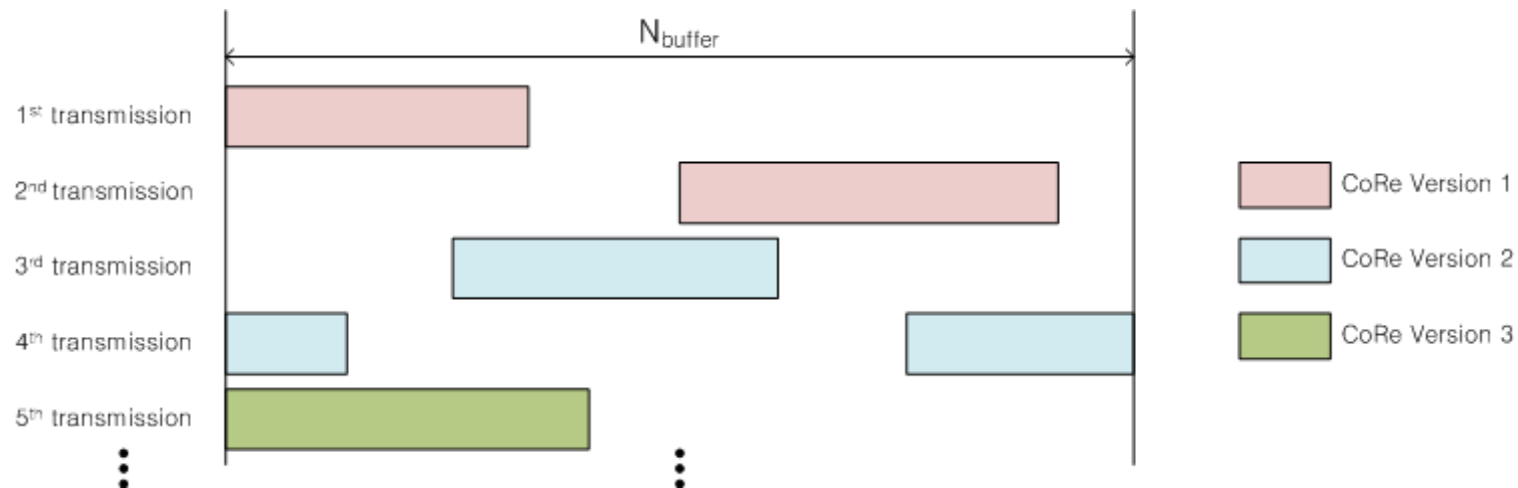
Text Proposal to 802.16m SDD

In lines 1~2 of page 124,

If comment #616 is accepted, insert following sentence in front of the last sentence of the chapter 11.13.2.2

All the QAM symbols in the same HARQ re-transmission use same Co-Re version. The specific ~

If comment #616 is rejected, modify as follows.

~~For each transmitted burst, the BitRe version is selected by the transmission number of this burst.~~ All the QAM symbols in the same HARQ re-transmission use same BitRe version. The specific ~