

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

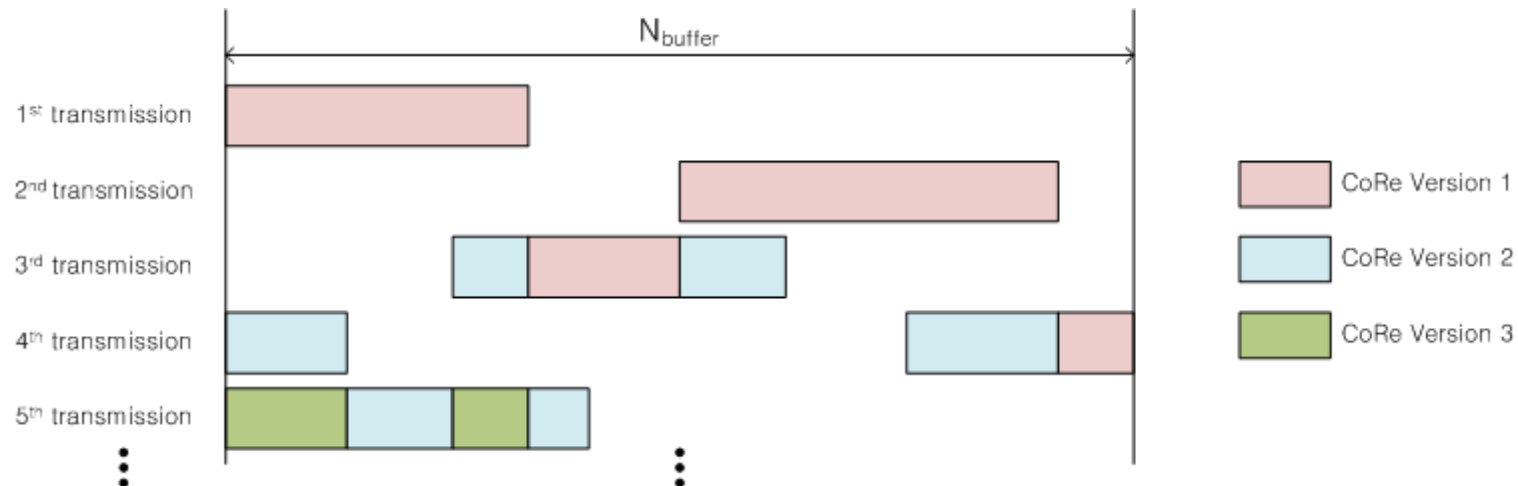
- Goal and scope of this contribution
 - Propose a constellation re-arrangement operation in IR HARQ for 802.16m
- Issue to be addressed in this contribution
 - The result of Session #58 on HARQ operation
 - Potential problem of current constellation re-arrangement scheme
 - New constellation re-arrangement 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.

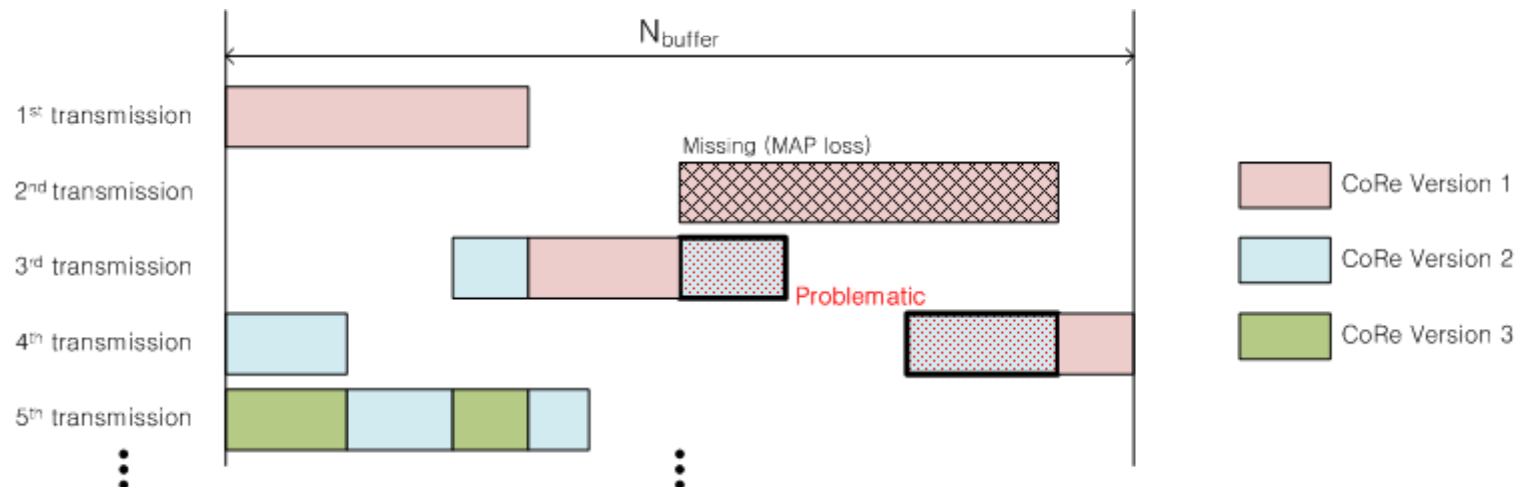
Current HARQ & CoRe operation

- 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.



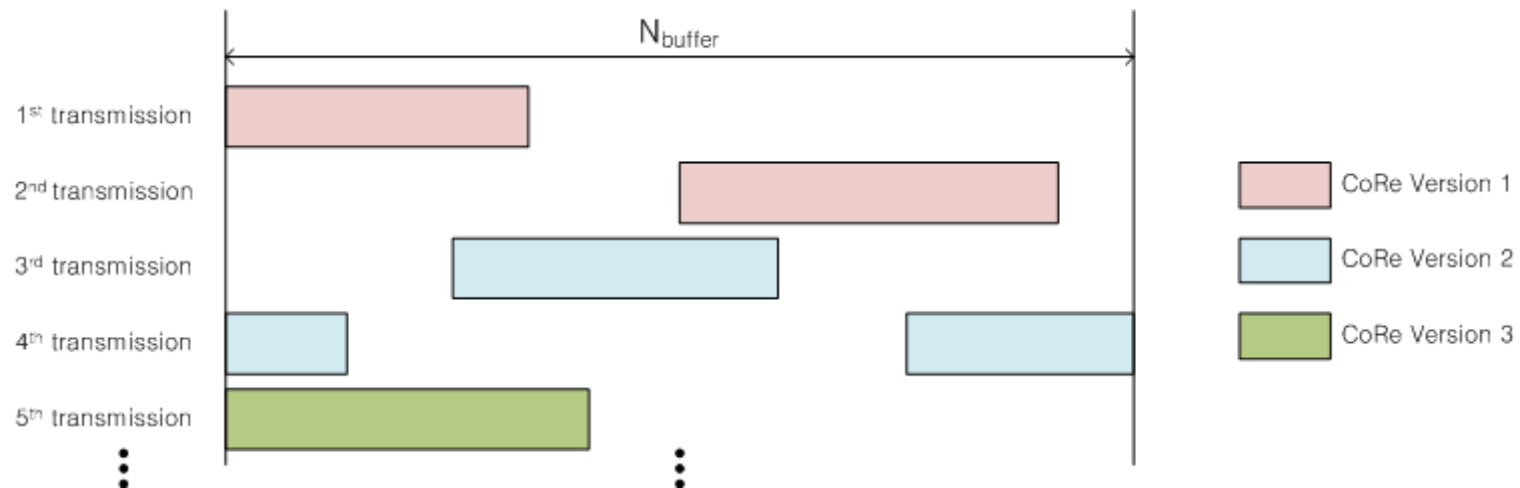
Problem of Current Co-Re Operation

- 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

Modify Chapter 11.13.2.2 in IEEE 802.16m-08/003r6 as follows;

11.13.2.2 **Bit**Constellation re-arrangement

~~Bit re-arrangement (BitRe)~~Constellation re-arrangement (Co-Re) 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.~~ The Co-Re can be expressed by a bit-level interleaver within a QAM symbol. All the QAM symbols in the same HARQ re-transmission use same Co-Re version. The specific ~~bit-level interleaver and inverter~~ selection mechanism is FFS.