

Proposal for Constellation Re-arrangement in IR HARQ

IEEE 802.16 Presentation Submission Template (Rev. 9)

Document Number:

IEEE C802.16m-09/0124

Date Submitted:

2009-01-05

Source:

Sung-Eun Park, Chiwoo Lim, Seunghoon Choi, Songnam Hong, Jaeweon Cho, Jaehee Cho, Heewon Kang, Hokyu Choi, DS Park

E-mail: {se.park, chiwoo.lim, seunghoon.choi, sn7955.hong, jaeweon.cho, jaehee1.cho, hkang, choihk, dspark} @samsung.com

Samsung Electronics, Co., Ltd.

416 Maetan-3, Suwon, 443-770, Korea

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:

IEEE C802.16m-08/1333r1

Purpose:

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

Notice:

This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups. It represents only the views of the participants listed in the “Source(s)” field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who reserve(s) the right to add, amend or withdraw material contained herein.

Release:

The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE’s name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE’s sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.

Patent Policy:

The contributor is familiar with the IEEE-SA Patent Policy and Procedures:

<<http://standards.ieee.org/guides/bylaws/sect6-7.html#6>> and <<http://standards.ieee.org/guides/opman/sect6.html#6.3>>.

Further information is located at <<http://standards.ieee.org/board/pat/pat-material.html>> and <<http://standards.ieee.org/board/pat>>.

Proposal for Constellation Re-arrangement in IR HARQ

*Sung-Eun Park, Seunghoon Choi, Chiwoo Lim, Songnam Hong,
Jaeweon Cho, Jaehee Cho, Heewon Kang, Hokyu Choi, DS Park*

Samsung Electronics Co., Ltd.

About This Contribution

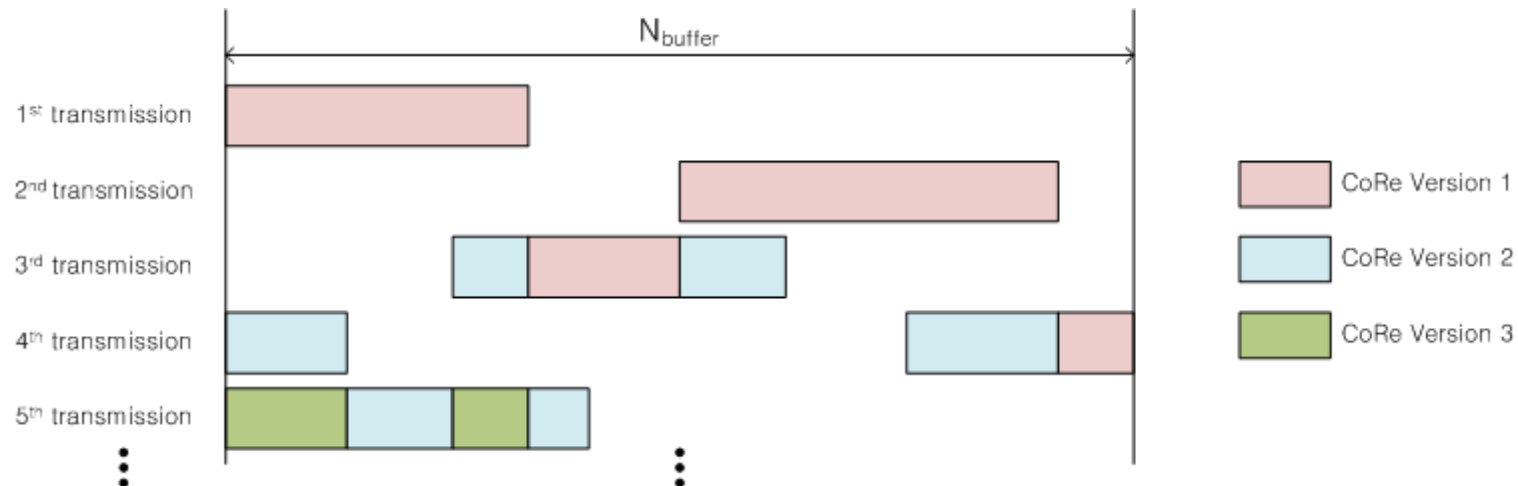
- Goal and scope of this contribution
 - Propose a constellation re-arrangement operation in IR HARQ for 802.16m
- Issue to be addressed in this contribution
 - The result of Session #58 on HARQ operation
 - Potential problem of current constellation re-arrangement scheme
 - New constellation re-arrangement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

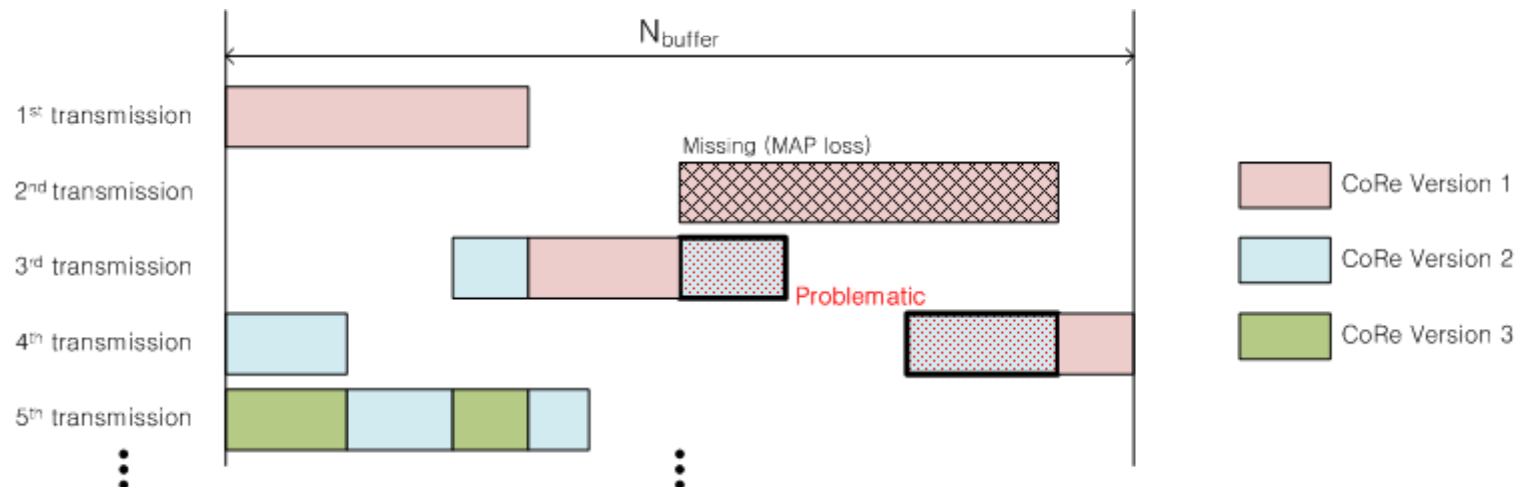
Current HARQ & CoRe operation

- 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.



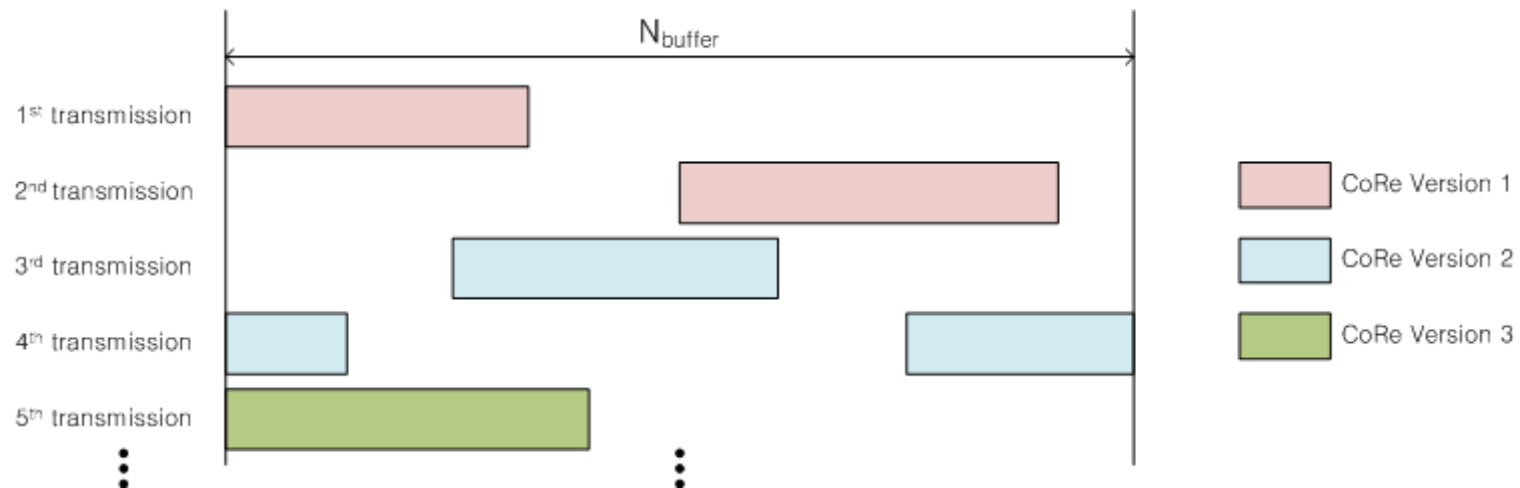
Problem of Current Co-Re Operation

- 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.