

ARQ Operation for IEEE 802.16m

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Venue:

Re: MAC: Data Plane; in response to the TGm Call for Contributions and Comments 802.16m-08/033 for Session 57

Base Contribution:

N/A

Purpose:

To discuss and adopt the proposed text in the next revision of the 802.16m SDD

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Introduction

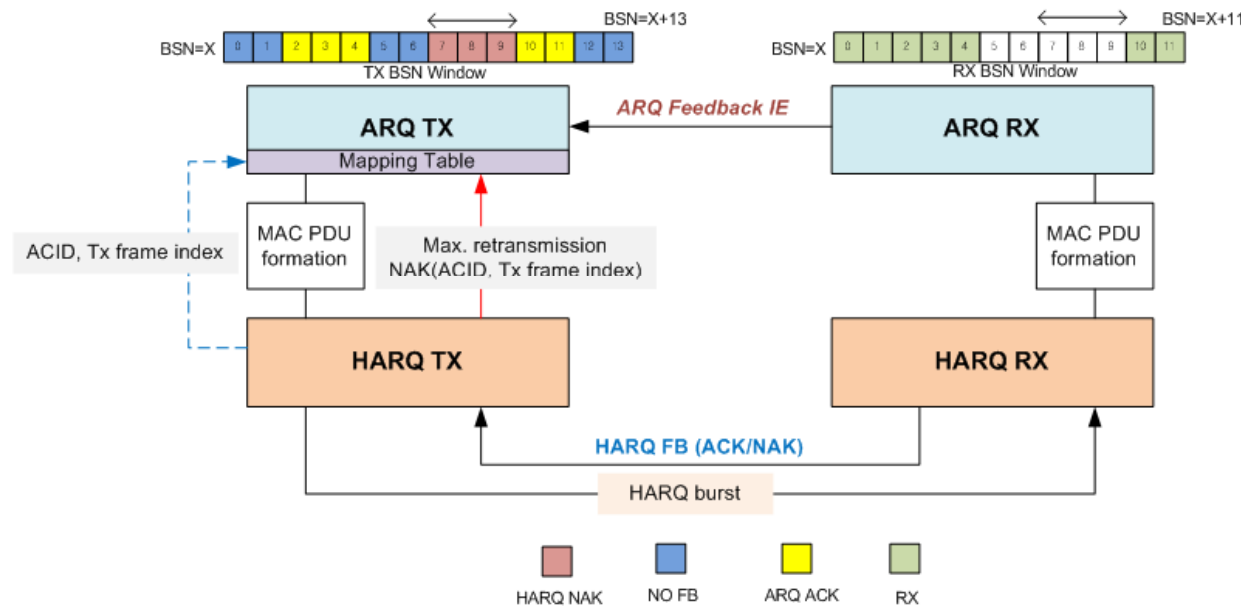
- ARQ operation in 802.16e
 - Selective repeat ARQ with selective/cumulative ACK.
 - ARQ Block concept for high radio efficiency.
 - ARQ sliding window control at both TX and RX.
 - Large delay and overhead owing to ARQ feedback.
- Approach to the cross-layered design
 - Trade off between complexity of inter-layer operation and performance enhancement.
- ARQ with HARQ
 - HARQ is essential to the wireless access system.
 - Duplicated feedback information between ARQ feedback and HARQ feedback.
 - Dedicated HARQ FB channel with fixed delay.

ARQ operation (1/4)

- Approach 1
 - ARQ scheme in legacy system.
- Approach 2
 - ARQ scheme in legacy system + Fast retransmission using HARQ feedback.
 - Management of a mapping table between HARQ and ARQ Feedback.
- Approach 3
 - Modified ARQ scheme in legacy system + HARQ-assisted Self-ARQ operation.
 - Management of a mapping table between HARQ and ARQ feedback.
 - No ARQ feedback
- Approach 4
 - Modified ARQ scheme in legacy system + HARQ-assisted Self-ARQ operation.
 - Management of a mapping table between HARQ and ARQ feedback.
 - Control of Timer for recovery of HARQ Feedback error.

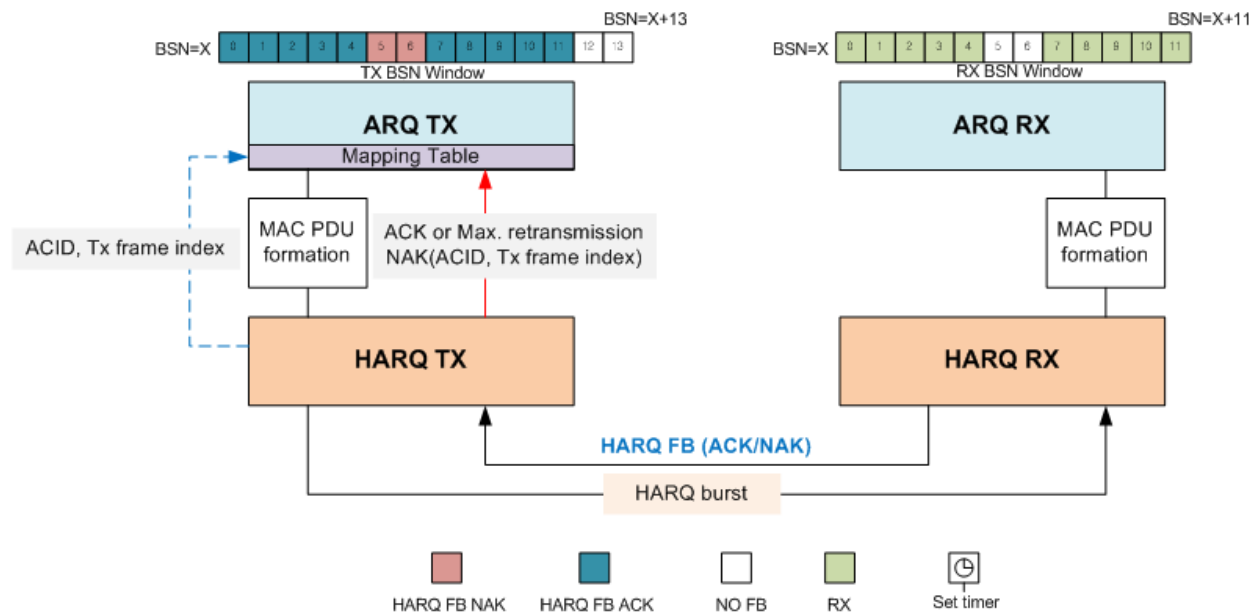
ARQ operation (2/4)

- Fast retransmission using HARQ Feedback (approach 2)
 - Selective-repeat ARQ & 100% ARQ ACK/NAK using conventional ARQ Feedback IE.
 - ARQ-TX side shall keep a mapping table between ARQ block and HARQ transmission info. (for example, ACID and frame index).
 - HARQ FB information(NAK after maximum retransmission) is used to retransmit the corresponding ARQ block before reception of ARQ feedback message → **fast retransmission**.



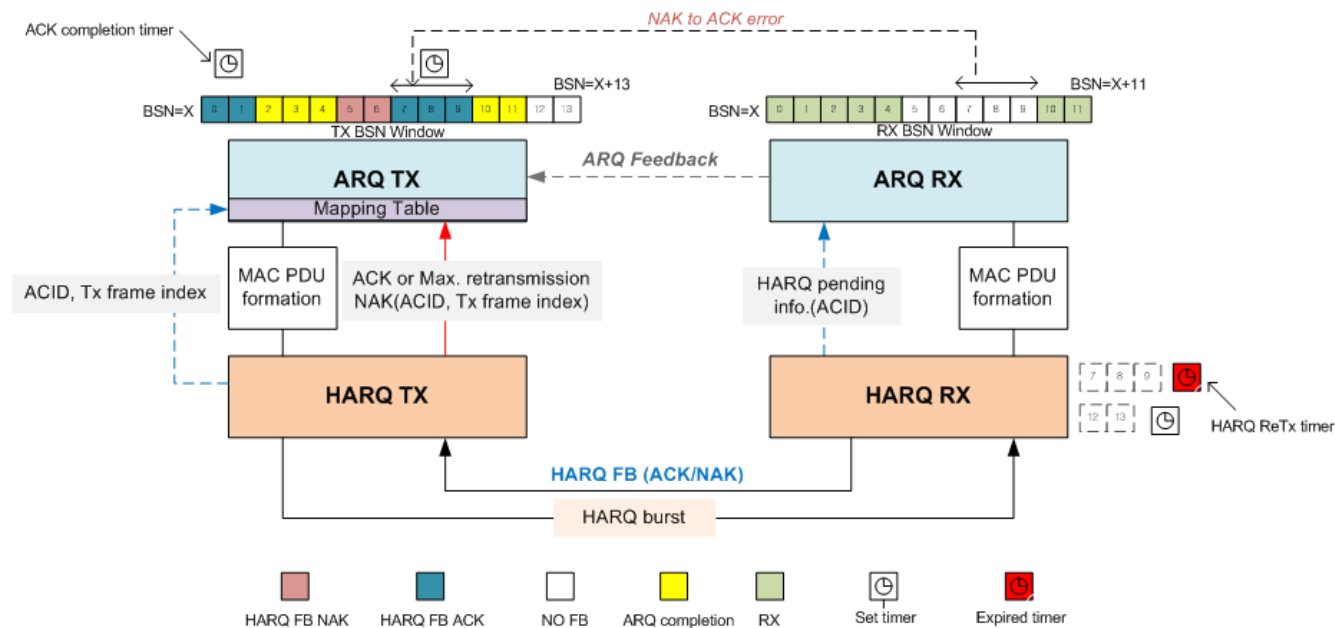
ARQ operation (3/4)

- HARQ-assisted Self-ARQ (approach 3)
 - HARQ FB information(ACK or NAK after maximum retransmission) is used to update ARQ-TX window.
 - ARQ-RX side does not send a ARQ feedback IE.
 - Fast ARQ & elimination of ARQ feedback overhead.
 - This is proper for the case that HARQ FB error can be neglected.



ARQ operation (4/4)

- HARQ-assisted Self-ARQ (approach 4)
 - Recovery of HARQ Feedback error (NAK to ACK error case)
 - ARQ-TX side starts a timer for completing block ACK if an HARQ ACK FB is delivered to ARQ-TX side. After expiration of this timer, ARQ-TX deletes the corresponding block.
 - HARQ-RX side triggers a transmission of *ARQ Feedback* if a HARQ retransmission timer is expired.
 - If *ARQ Feedback* is delivered, the corresponding ACK completion timer stops and a ARQ retransmission is performed.



Proposed Text

[In 80216m-08_003r4, Section 10, add the following text]

10.x. ARQ Operations

10.x.1 Basic Principles

In case that HARQ is working, selective-ARQ scheme with HARQ feedback is used for fast ARQ operation. HARQ feedback information(ACK or NAK after maximum retransmission) is used to update ARQ-TX sliding window. ARQ-TX side shall keep a mapping table between ARQ block and HARQ transmission info. (for example, ACID and frame index). HARQ-RX side can trigger a transmission of *ARQ Feedback* if a HARQ retransmission timer is expired.

[In 80216m-08_003r4, Section 10.2.3 , add the following text]

10.2.3 HARQ and ARQ Interactions

HARQ-TX provides ARQ-TX with HARQ transmission and HARQ feedback information internally. HARQ-RX provides ARQ-RX with HARQ state information.