# [A-MAP relevance and HARQ timing for long TTI transmission (Section 15.3.9.2.2)]

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   This is a contribution

Purpose:

   Discuss and adopt the proposed text

Notice:

Release:

Patent Policy:

# A-MAP Relevance and HARQ Timing for Long TTI Transmission (Section 15.3.9.2.2)

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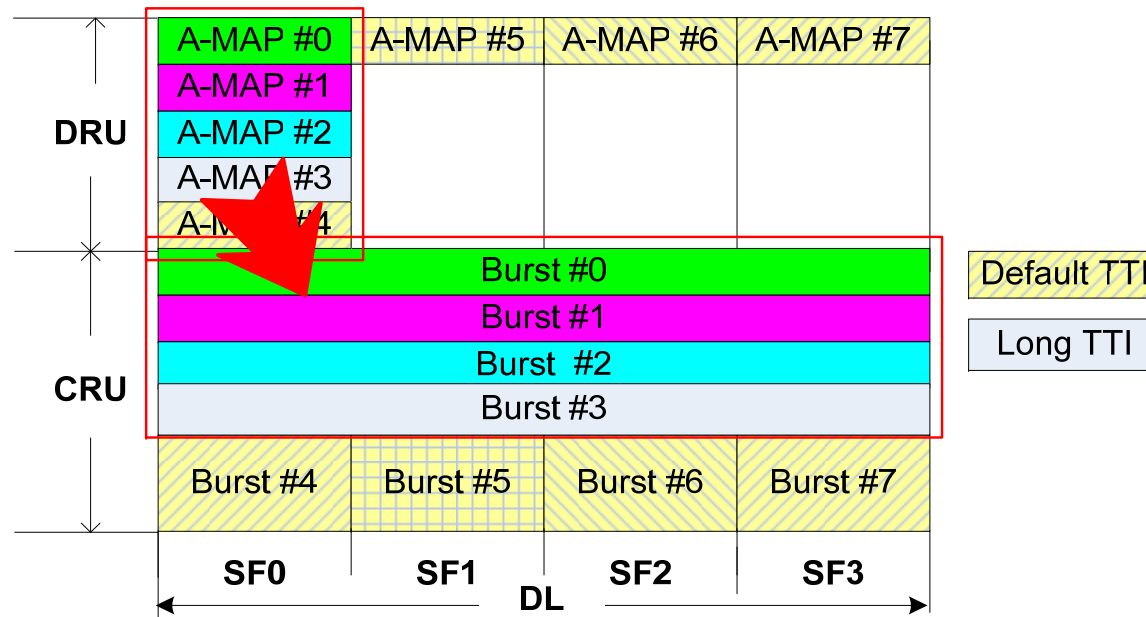Mihyun Lee, Hyunkyu Yu, Jaeweon Cho, Hokyu Choi

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# Long TTI Transmission

- A data burst occupies contiguous multiple subframe

  - 4 in FDD DL/UL

  - D in TDD DL, U in TDD UL

- Purpose of long TTI transmission

  - UL Coverage Enhancement

  - Signaling Overhead Reduction

# Current A-MAP Relevance

- The transmission of the A-MAPs for long TTI burst are concentrated in a certain subframe as $0^{th}$ subframe (SF0)

| DRU | A-MAP #0 | A-MAP #5 | A-MAP #6 | A-MAP #7 |
|---|---|---|---|---|
| | A-MAP #1 | | | |
| | A-MAP #2 | | | |
| | A-MAP #3 | | | |
| | A-MAP #4 | | | |

Burst #0
Burst #1
Burst #2
Burst #3

CRU

| Burst #4 | Burst #5 | Burst #6 | Burst #7 |
|---|---|---|---|

SF0    SF1    SF2    SF3

DL

Default TTI
Long TTI

- A-MAP region in $0^{th}$ subframe become larger and larger according to number of long TTI bursts → large DRU regions are needed for A-MAP → limit to CRU region
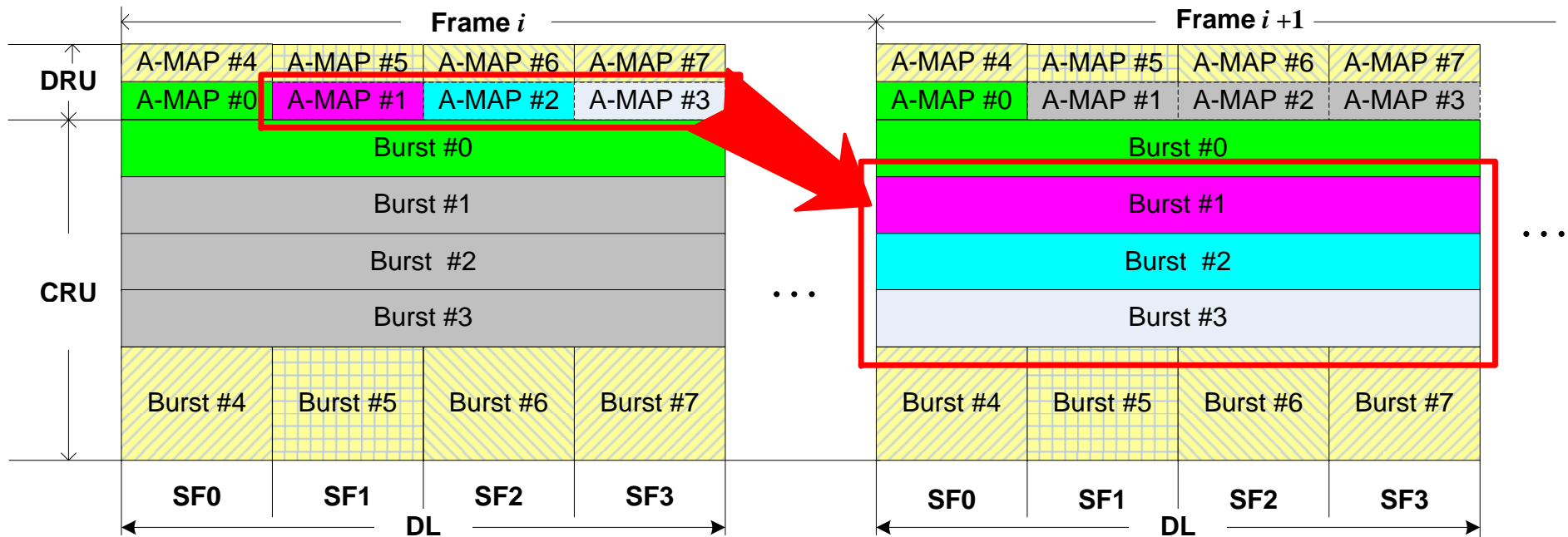
# Current HARQ Feedback Timing

- HARQ feeback corresponding long TTI burst shall be transmitted in 0th UL subframe
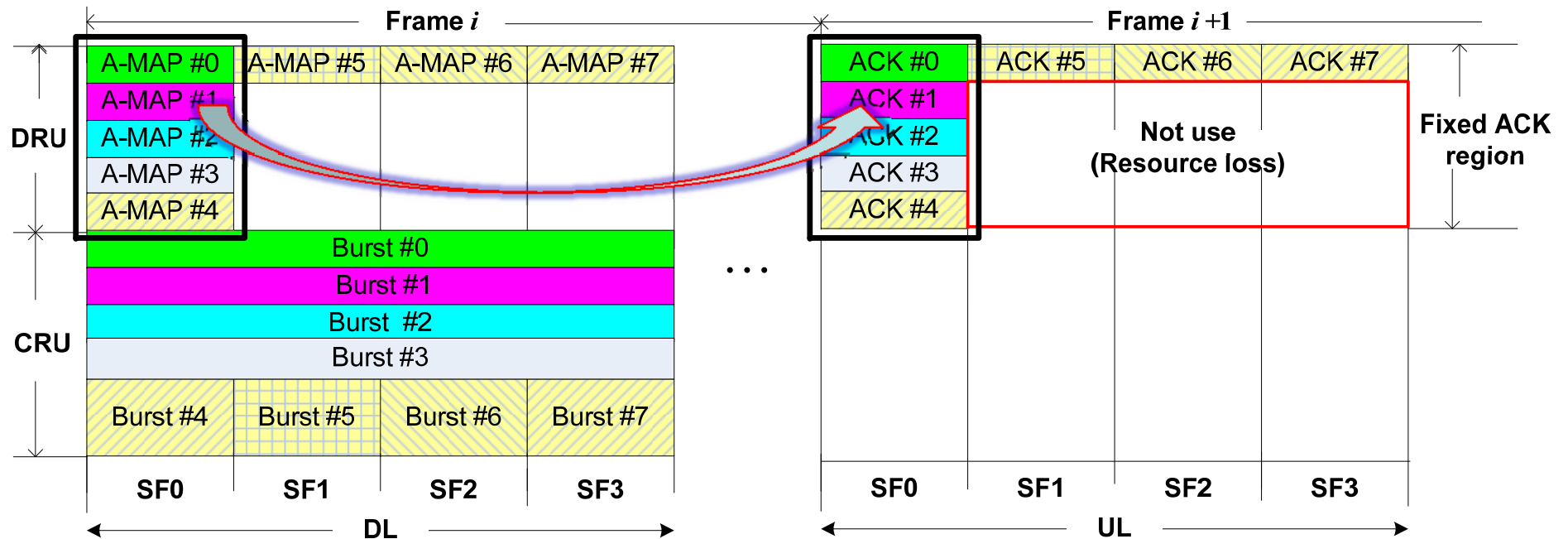
# Proposed A-MAP Relevance

- Long TTI transmission begins in $0^{th}$ subframe of next frame when DL subframes (except $0^{th}$ ) contains the A-MAPs indicating long TTI
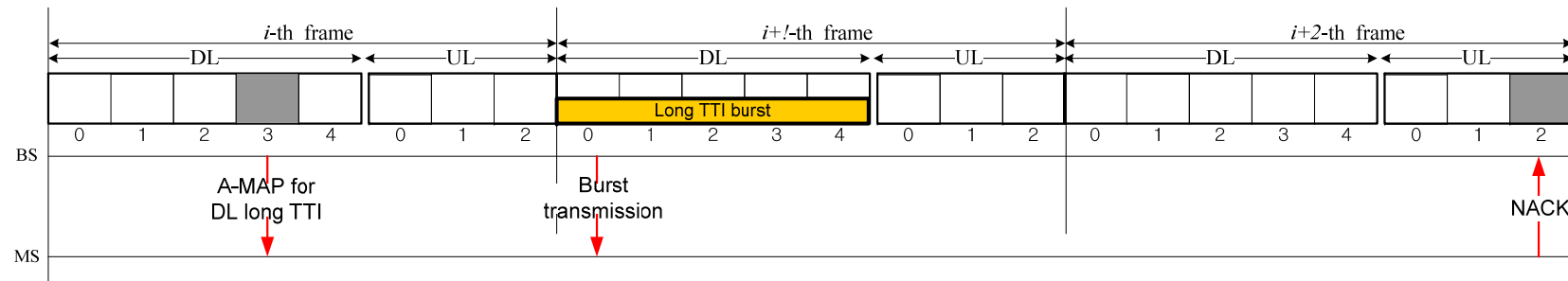
# Proposed HARQ Feedback Timing

- HARQ feeback corresponding long TTI burst is transmitted in the UL subframe corresponding DL subframe index contains the burst's A-MAP
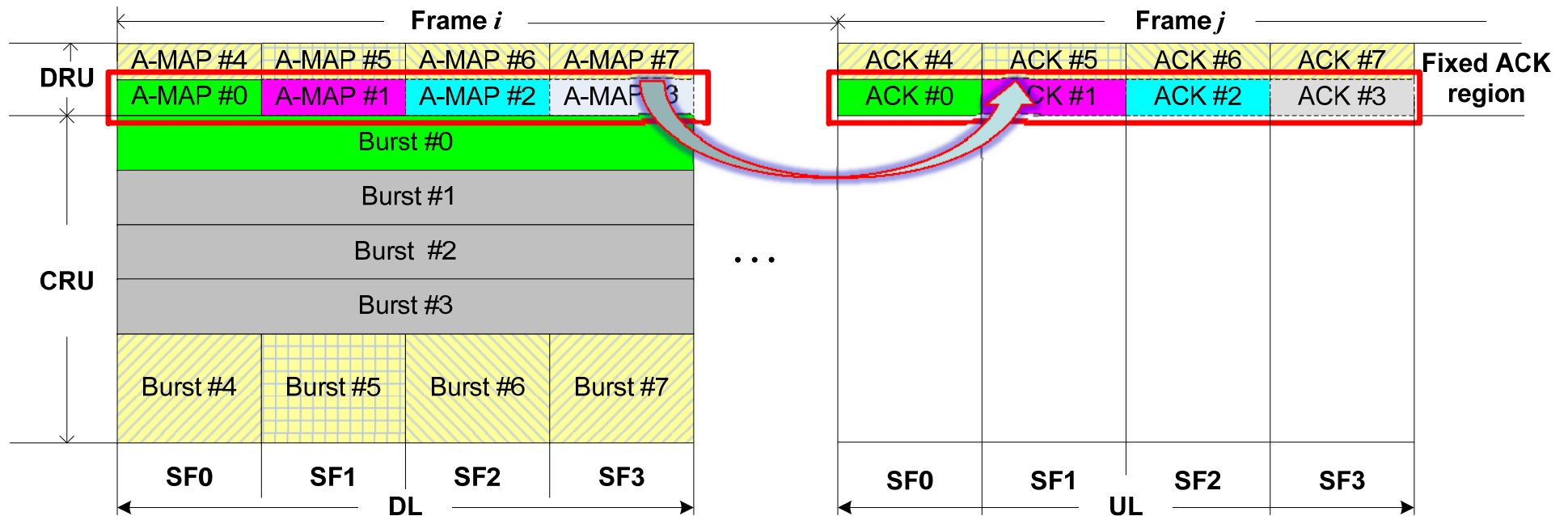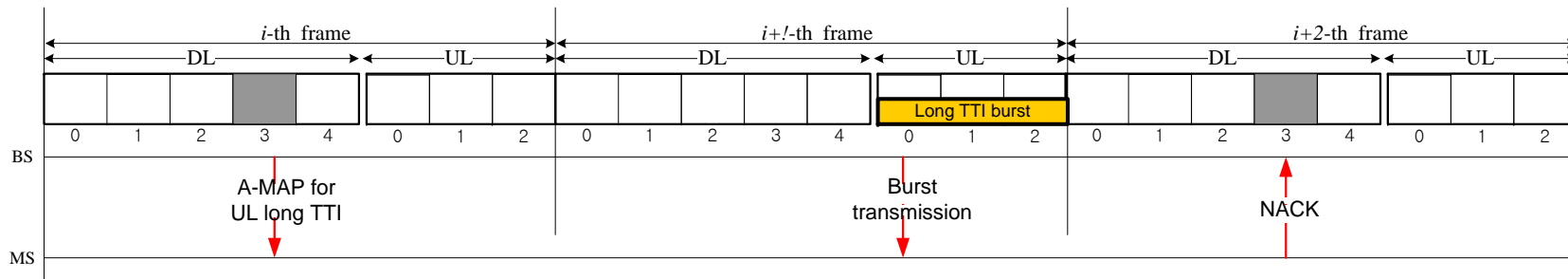
# Examples of Proposed Timing

- DL long TTI (e.g. Tproc = 3 subframes)



- UL long TTI (e.g. Tproc = 3 subframes)

# Proposed Remedy #1 (TDD DL HARQ)

Add the following text in line 29, page 176, section 15.3.9.2.2.2.1

Note that when a DL Basic Assignment A-MAP IE in the $l$-th subframe of the $i$-th frame indicates the long TTI transmission and $l$ is 0, the subframe index $m$ and frame index $j$ shall be calculated as shown in Table 725.

When a DL Basic Assignment A-MAP IE in the $l$-th subframe of the $i$-th frame indicates the long TTI transmission and $l$ is not 0, the long TTI transmission of the DL HARQ subpacket shall begin in the 0-th DL subframe of the $(i+1)$-th frame. A HARQ feedback for this long TTI transmission shall be transmitted in the $n$-th subframe of the $j$-th frame. The subframe index $n$ and the frame index $j$ shall be calculated according to equations in Table 725, with replacing the subframe index $m$ and frame index $i$ by $l$ and $i+1$, respectively.

# Proposed Remedy #2 (TDD UL HARQ)

Add the following text in line 60, page 177, section 15.3.9.2.2.2.2

When an UL Basic Assignment A-MAP IE in the $l$-th subframe of the $i$-th frame indicates the long TTI transmission, the UL HARQ subpacket transmission shall begin in the 0-th UL subframe of the $j$-th frame. A HARQ feedback for this long TTI transmission shall be transmitted in the $l$-th DL subframe of the $k$-th frame. When the UL HARQ feedback indicates a negative acknowledgement, retransmission of the UL HARQ subpacket shall begin in the 0-th UL subframe of the $p$-th frame. The frame index $j, k, p$ shall be calculated according to equations in Table 726, with replacing the subframe index $m$ by 0.