

IEEE 802.16m HARQ Protocol and Timing

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Venue:

TGm – Call for contributions on Project 802.16m System Description Document – IEEE 802.16m-08/016r1
(HARQ protocol and timing)

Base Contribution:

IEEE C802.16m-08/274

Abstract:

Proposal for 16m HARQ protocol and timing.

Purpose:

Adoption of proposed text/content for 802.16m System Description Document

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HARQ Protocol Design

- ❑ HARQ with incremental redundancy
- ❑ Synchronized HARQ
 - Advantages
 - Reduce signaling overhead
 - Disadvantages
 - Less flexible
 - Restrictive for systems with various subframe bundling and various DL/UL split in TDD
- ❑ Asynchronornized HARQ
 - Advantages
 - Flexible for various subframe bundling and various DL/UL split in TDD
 - Disadvantages
 - Higher overhead
 - HARQ process ID
 - HARQ redundancy version ID

Key Parameters

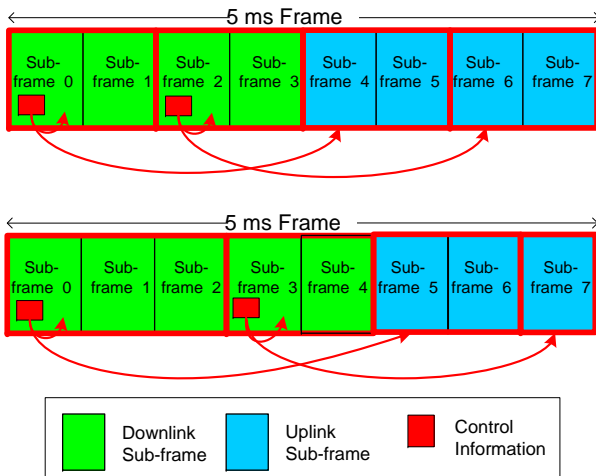
- ❑ MS data burst processing delay
 - Time from end of reception of DL data burst to start of UL ACK/NACK transmission
 - 2 subframe (12 OFDM symbols, or 1.23 ms) - T_p (tx delay)
- ❑ BS data burst processing delay
 - Time from end of reception of UL data burst to start of DL ACK/NACK transmission
 - 2 subframe (12 OFDM symbols, or 1.23 ms)
- ❑ MS scheduling & processing delay
 - Time from end of reception of DL NACK to start of UL HARQ re-transmission
 - 2 subframe (12 OFDM symbols, or 1.23 ms) - T_p (tx delay)
- ❑ BS scheduling & processing delay
 - Time from end of reception of UL NACK to start of DL HARQ re-transmission
 - 2 subframe (12 OFDM symbols, or 1.23 ms)

TDD DL/UL Split and Grouping

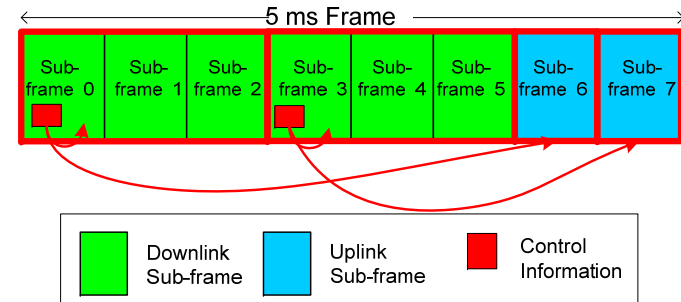
- ❑ Multiple Subframes may be grouped into a HARQ group
- ❑ Always partition one frame into two HARQ groups
 - HARQ group can reduce latency
- ❑ Each HARQ group contains multiple DL subframes and multiple UL subframes
 - TDD Split 4:4
 - DL (2) : DL (2) : UL (2) : UL (2)
 - TDD Split 5:3
 - DL (3) : DL (2) : UL (2) : UL (1)
 - TDD Split 6:2
 - DL (3) : DL (3) : UL (1) : UL (1)

HARQ Latency

- ❑ HARQ delay latency is the Time between 1st transmission and re-transmission
- ❑ HARQ latency for FDD is less than 5 ms
- ❑ HARQ latency for TDD depends on DL/UL split and grouping

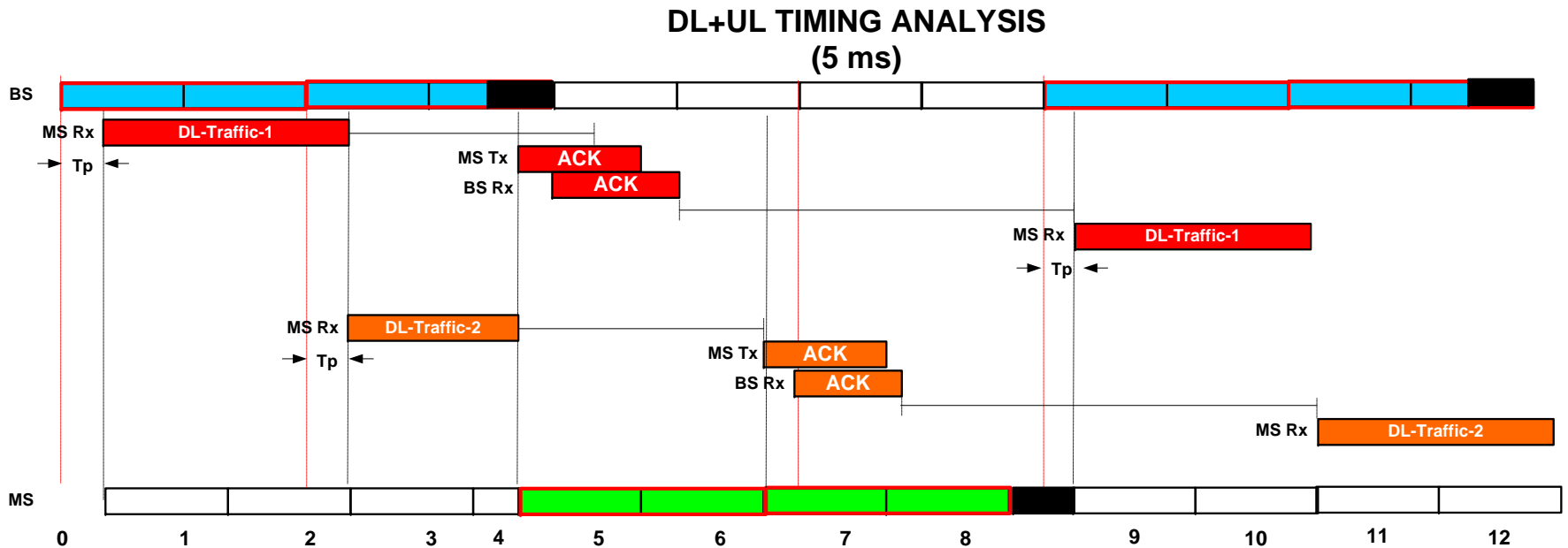


HARQ latency is 5 ms



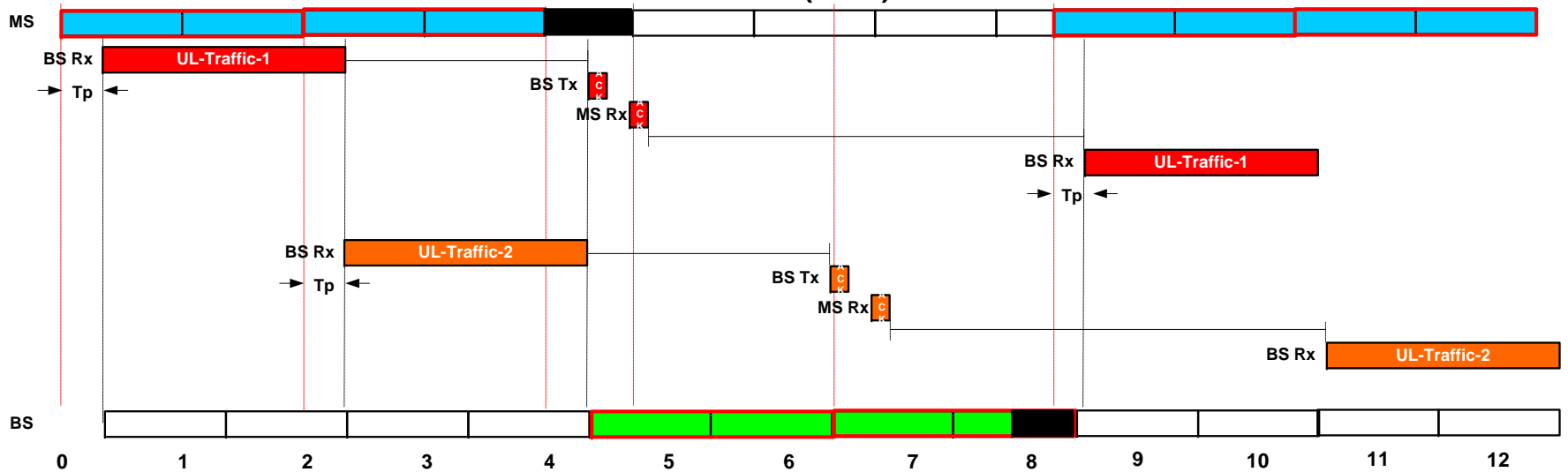
HARQ latency is 10 ms

TDD (4/4) DL HARQ Timing



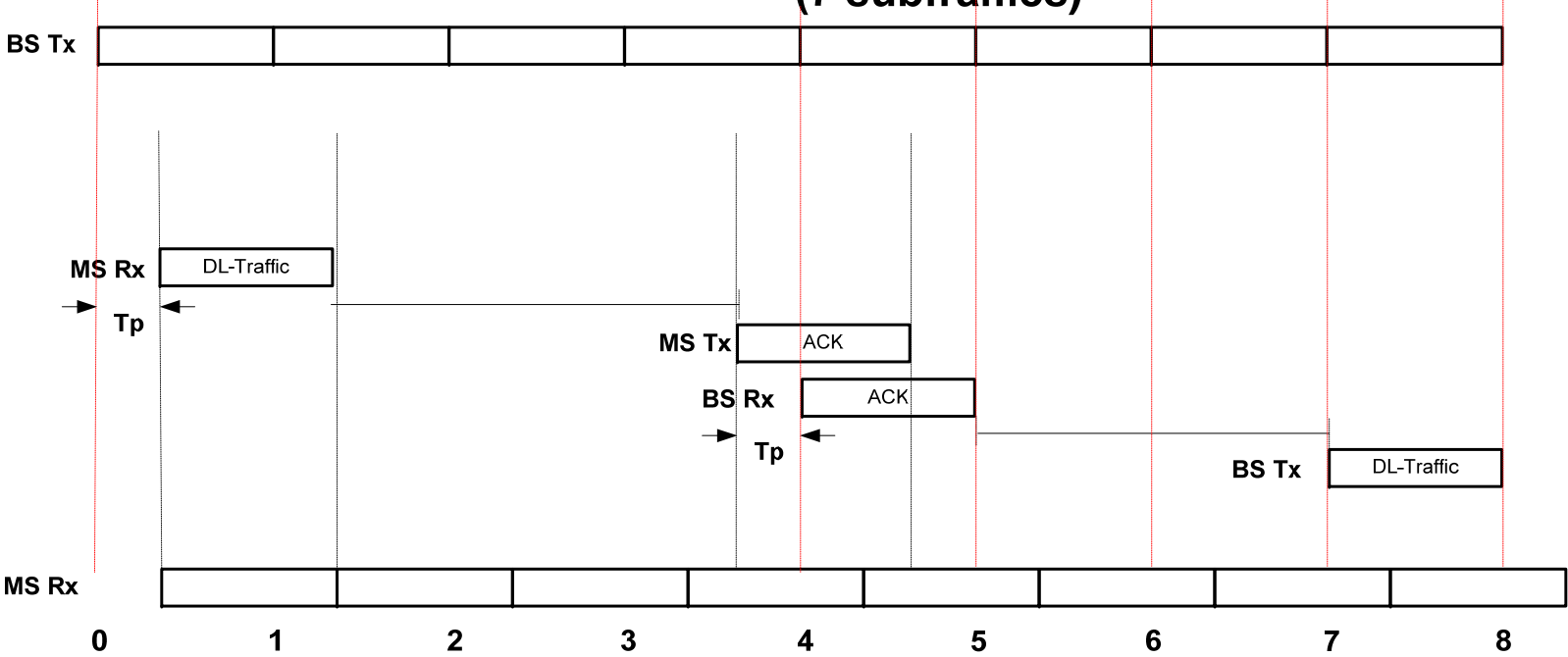
TDD (4/4) UL HARQ Timing

DL+UL TIMING ANALYSIS
(5 ms)



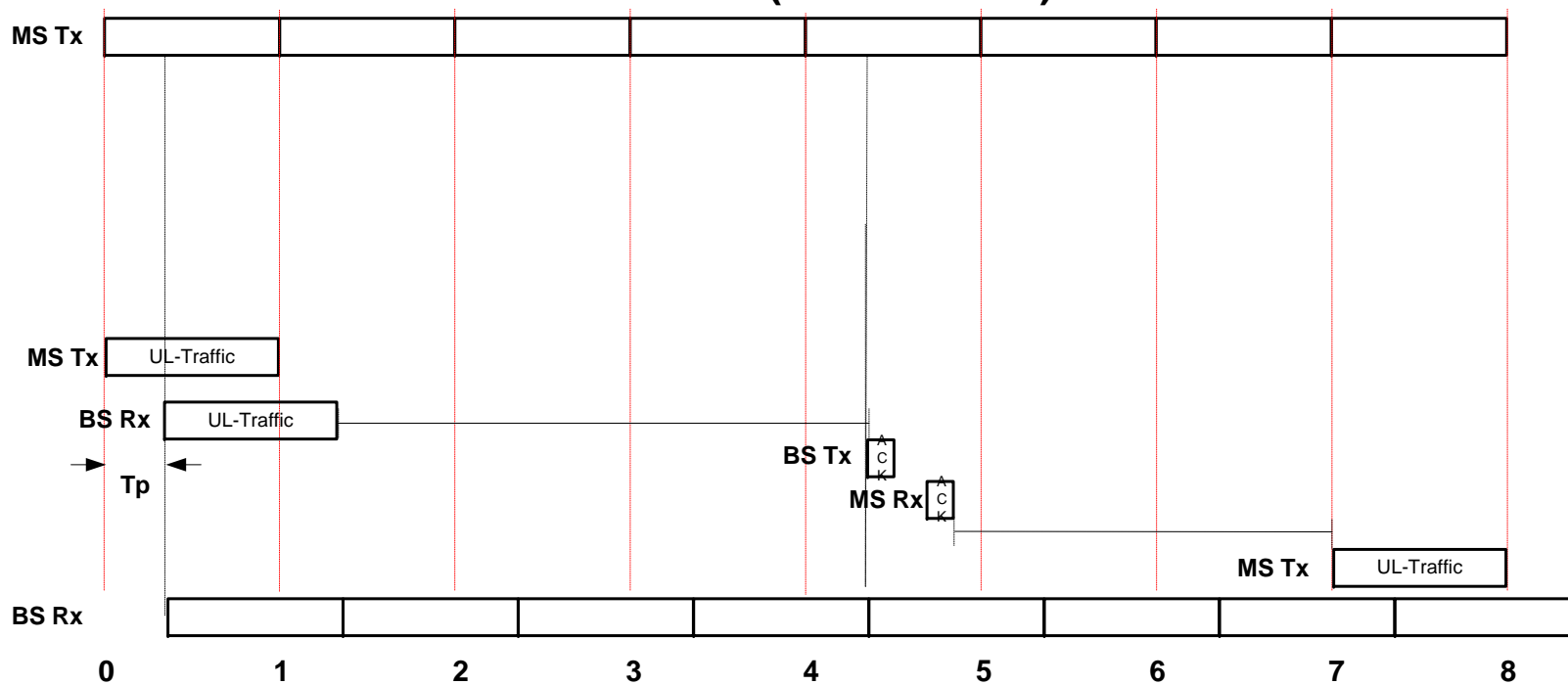
FDD DL HARQ Timing

DL+UL TIMING ANALYSIS (7 subframes)



FDD UL HARQ Timing

DL+UL TIMING ANALYSIS (7 subframes)



Proposed Text for 16m SDD

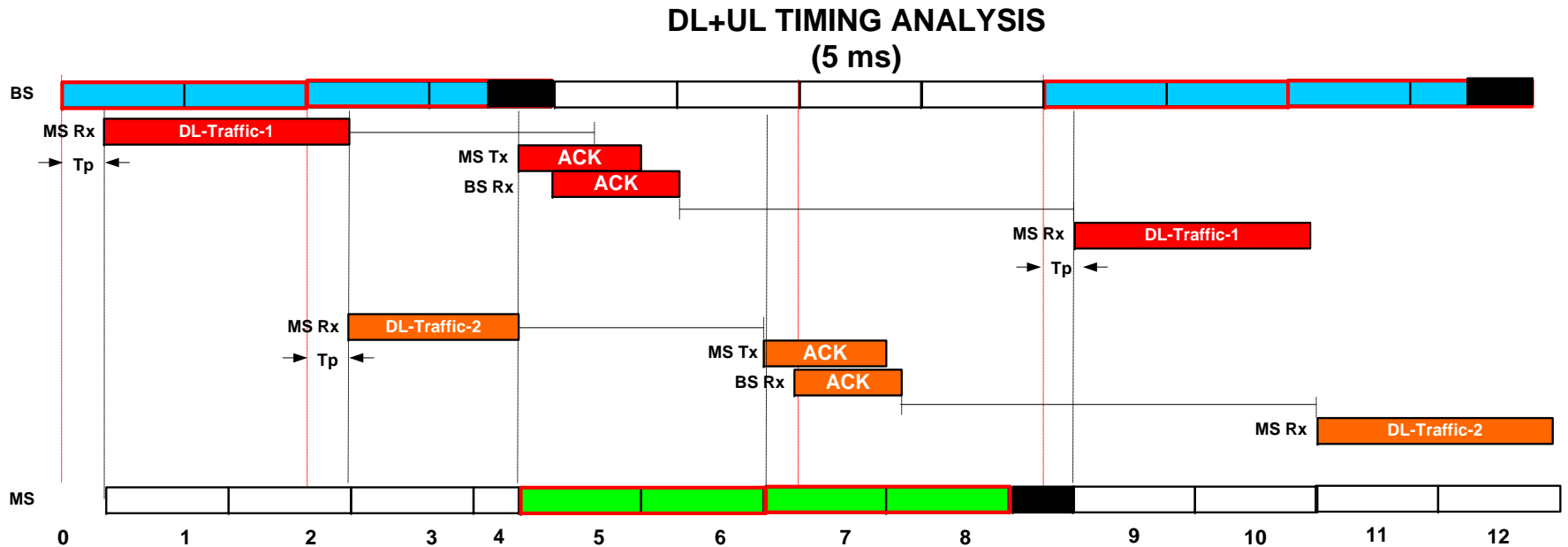
- ❑ HARQ with incremental redundancy
- ❑ Synchronized HARQ protocol for DL and UL HARQ
- ❑ HARQ parameters
 - MS data burst processing delay
 - Time from end of reception of DL data burst to start of UL ACK/NACK transmission
 - 2 subframe (12 OFDM symbols, or 1.23 ms) - T_p (tx delay)
 - BS data burst processing delay
 - Time from end of reception of UL data burst to start of DL ACK/NACK transmission
 - 2 subframe (12 OFDM symbols, or 1.23 ms)
 - MS scheduling & processing delay
 - Time from end of reception of DL NACK to start of UL HARQ re-transmission
 - 2 subframe (12 OFDM symbols, or 1.23 ms) - T_p (tx delay)
 - BS scheduling & processing delay
 - Time from end of reception of UL NACK to start of DL HARQ re-transmission
 - 2 subframe (12 OFDM symbols, or 1.23 ms)

Proposed Text for 16m SDD (Cont')

- ❑ Multiple Subframes may be grouped into a HARQ group
- ❑ Always partition one frame into two HARQ groups
- ❑ Each HARQ group contains multiple DL subframes and multiple UL subframes
 - TDD Split 4:4
 - DL (2) : DL (2) : UL (2) : UL (2)
 - TDD Split 5:3
 - DL (3) : DL (2) : UL (2) : UL (1)
 - TDD Split 6:2
 - DL (3) : DL (3) : UL (1) : UL (1)
- ❑ HARQ delay latency is the Time between 1st transmission and re-transmission
- ❑ HARQ latency for FDD is less than 5 ms
- ❑ HARQ latency for TDD depends on DL/UL split and grouping

Proposed Text

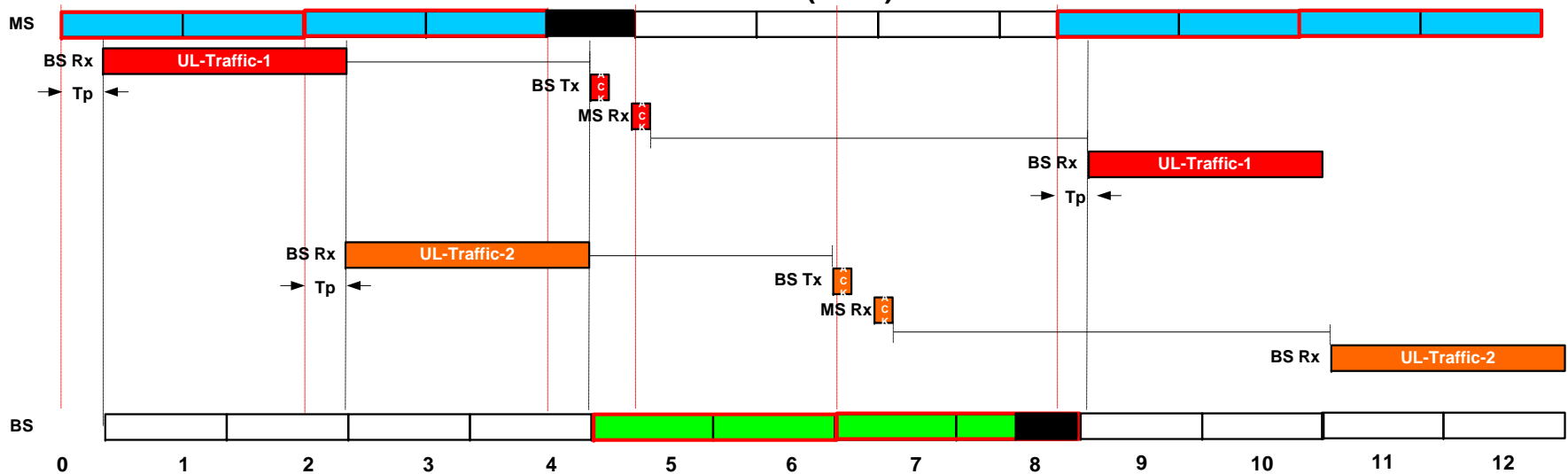
TDD (4/4) DL HARQ Timing (Example)



Proposed Text

TDD (4/4) UL HARQ Timing (Example)

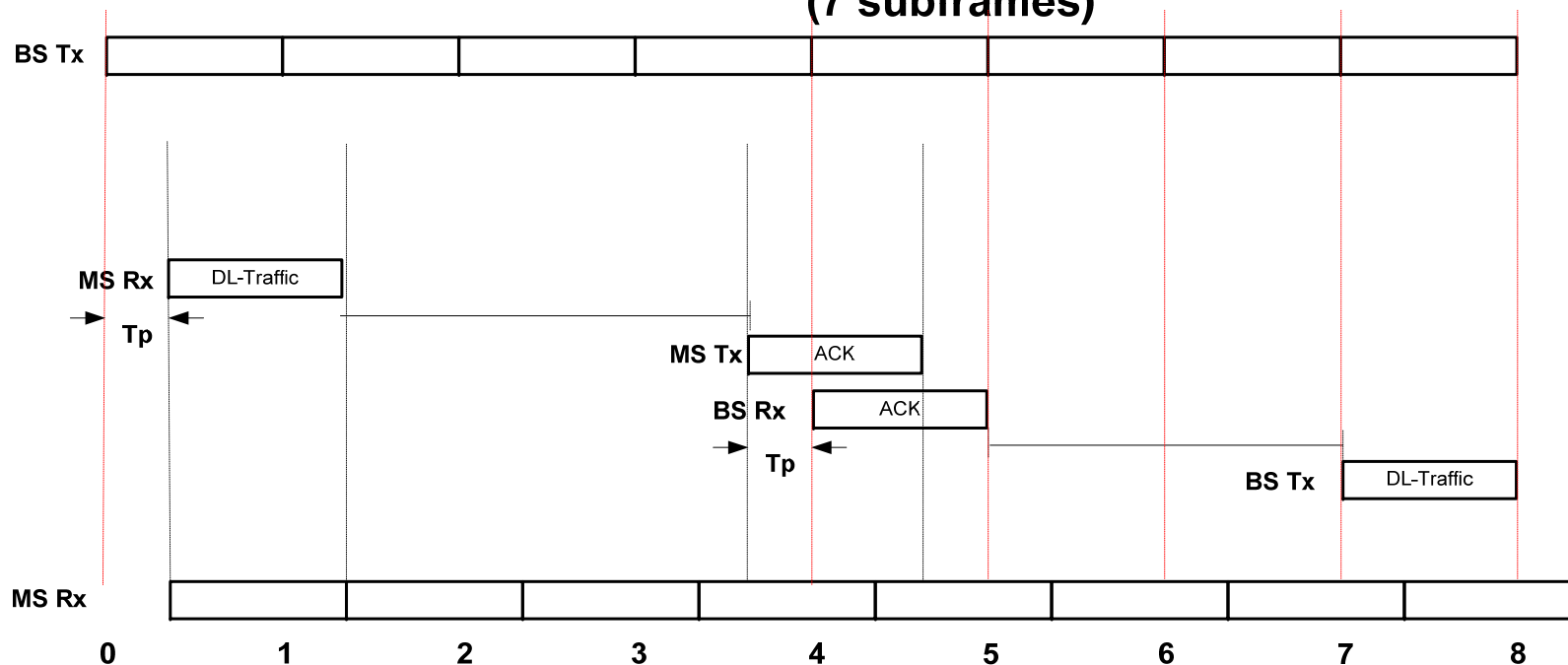
DL+UL TIMING ANALYSIS
(5 ms)



Proposed Text

FDD DL HARQ Timing

DL+UL TIMING ANALYSIS (7 subframes)



Proposed Text

FDD UL HARQ Timing

DL+UL TIMING ANALYSIS (7 subframes)

