Legacy Support Modes in D2 (15.3.3.5)

IEEE 802.16 Presentation Submission Template (Rev. 9)

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C80216m-09_2309

Purpose:
The current backward compatibility modes in D2 do not meet the requirements for legacy support defined in the SRD. The document proposes changes to the frame structure to meet the goals of the SRD.

Introduction

- ***The current backward compatibility modes in D2 do not meet the requirements for legacy support in the SRD***
  - ***The performance does not scale with the fraction of deployed 16m mobiles***
- ***Modest changes to the frame structure and the definition of backward compatibility are needed.***
  - ***Placement of the 16m preamble when 16m and 16e coexist on the same carrier***
  - ***SFH message indicating a legacy frame structure is being used***

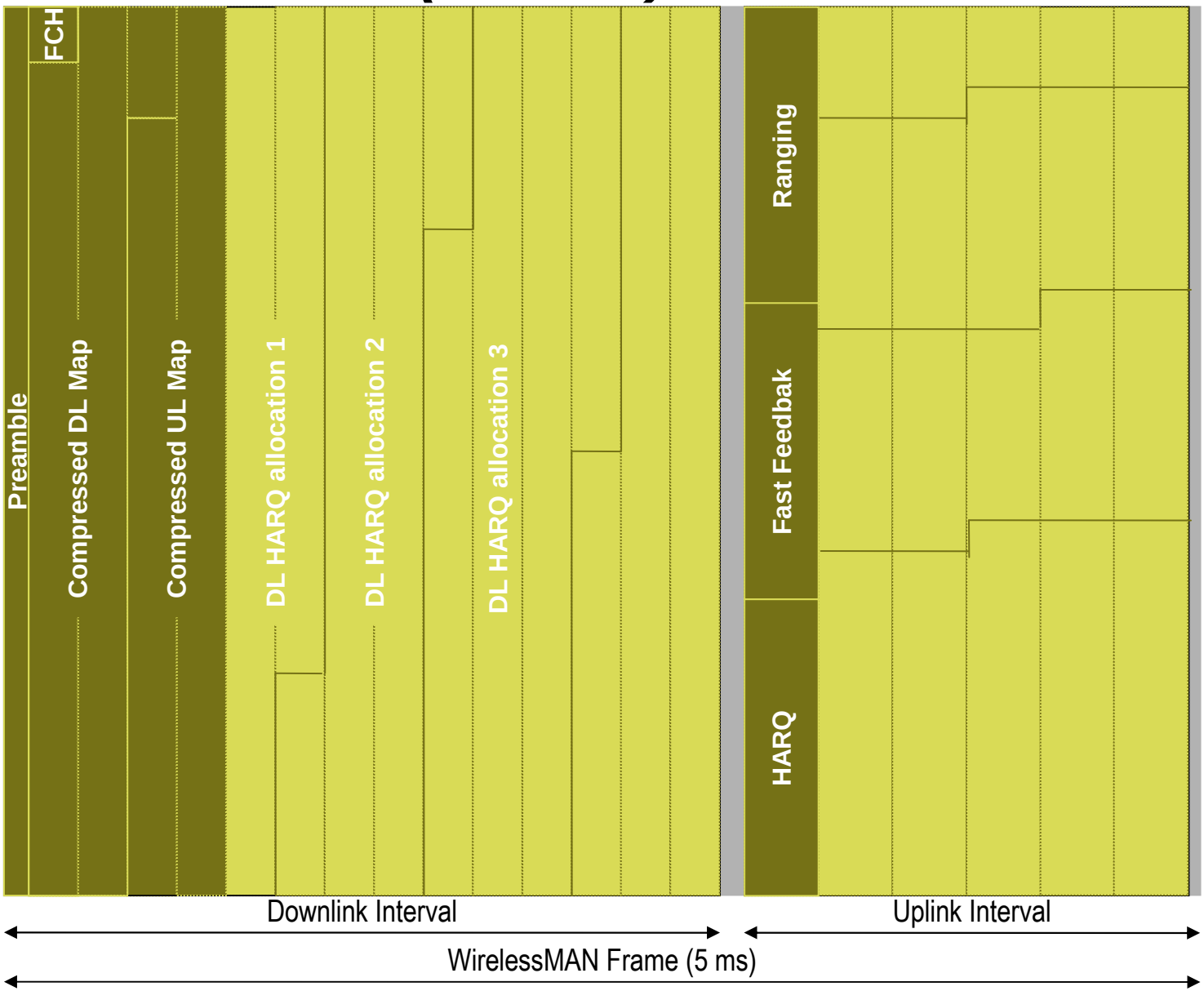
16m/D2 Defines a Static 16m/16e Split

- ***15.3.3.5 Frame structure supporting WirelessMAN-OFDMA***
  - ***The WirelessMAN-OFDMA and the Advanced Air Interface frames shall be offset by a fixed number of subframes, FRAME_OFFSET = 1,2, ... , K***
  - ***The number of symbols in the WirelessMAN-OFDMA DL Zone is 5+6·(FRAME_OFFSET-1).***
  - ***Bursts for AMS can be scheduled in either zone (Advanced Air Interface DL Zone or WirelessMAN OFDMA DL Zone) according to the mode (Advanced Air Interface or WirelessMAN-OFDMA) with which the AMS is connected to the ABS, but not in both zones at the same time.***

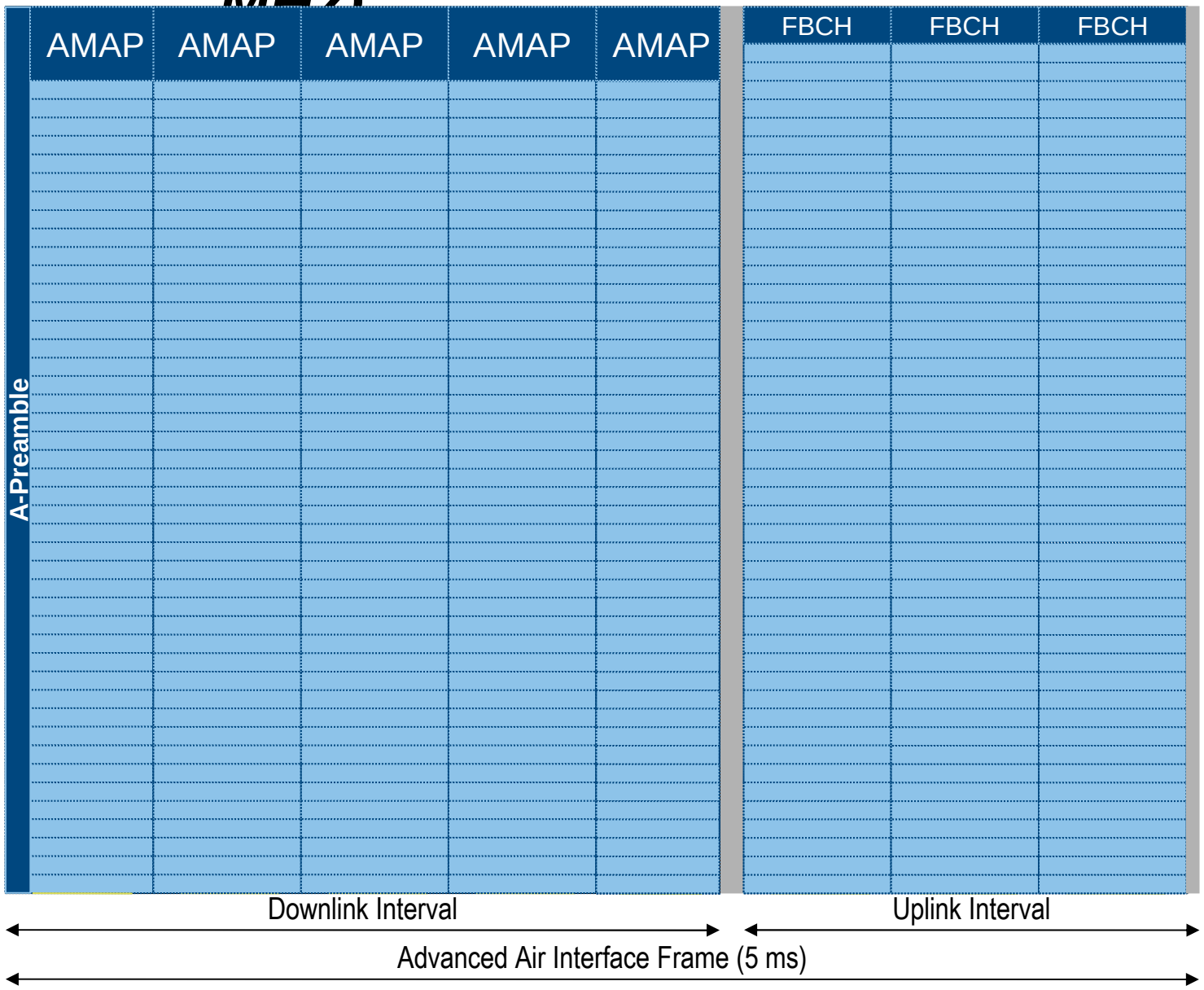
Static is Inconsistent with Requirements

- ***IEEE 802.16m System Requirements Document (SRD), r9, Subclause 5.1***
  - ***An IEEE 802.16m MS shall be able to operate with a legacy BS, at a level of performance equivalent to that of a legacy MS.***
  - ***Systems based on IEEE 802.16m and the WirelessMAN-OFDMA Reference System shall be able to operate on the same RF carrier, with the same channel bandwidth; and should be able to operate on the same RF carrier with different channel bandwidths.***
  - ***An IEEE 802.16m BS shall support a mix of IEEE 802.16m and legacy MSs when both are operating on the same RF carrier. The system performance with such a mix should improve with the fraction of IEEE 802.16m MSs attached to the BS.***
  - ***An IEEE 802.16m BS shall support handover of a legacy MS to and from a legacy BS and to and from IEEE 802.16m BS, at a level of performance equivalent to handover between two legacy BSs.***
  - ***An IEEE 802.16m BS shall be able to support a legacy MS while also supporting IEEE 802.16m MSs on the same RF carrier, at a level of performance equivalent to that a legacy BS provides to a legacy MS.***

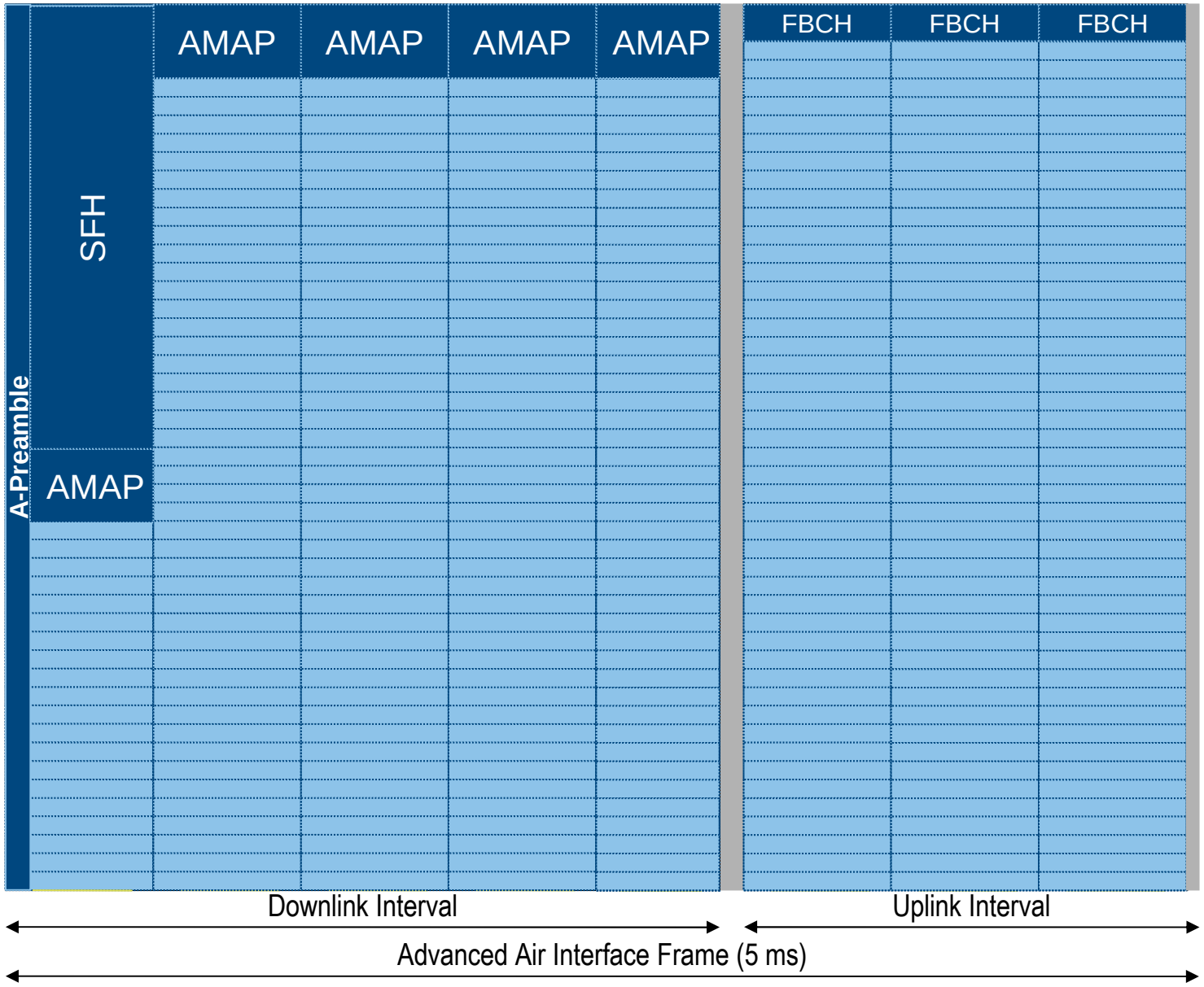
Logical WirelessMAN OFDMA Frame (10 MHz)



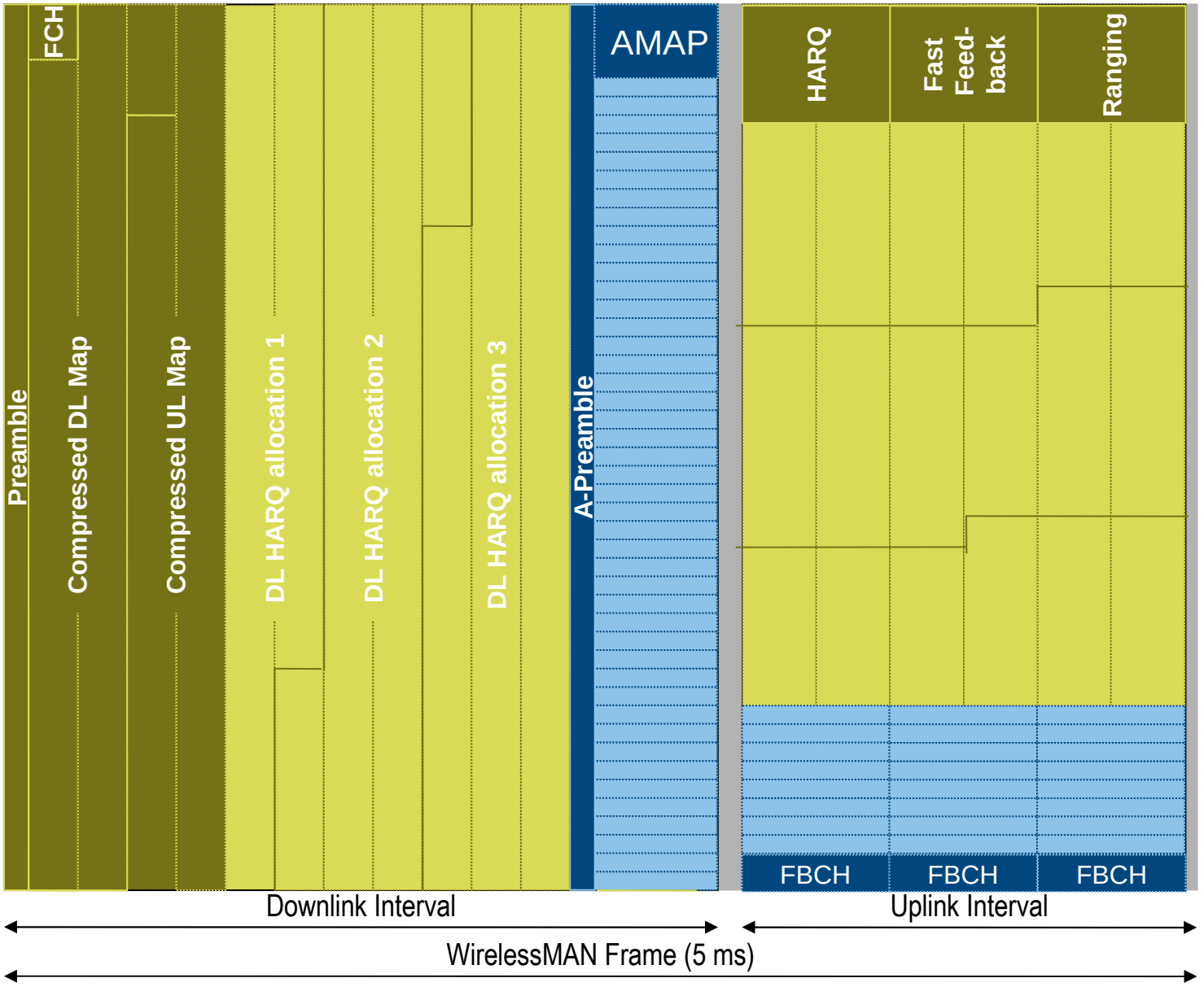
Logical IEEE 802.16m Frame (10 MHz)



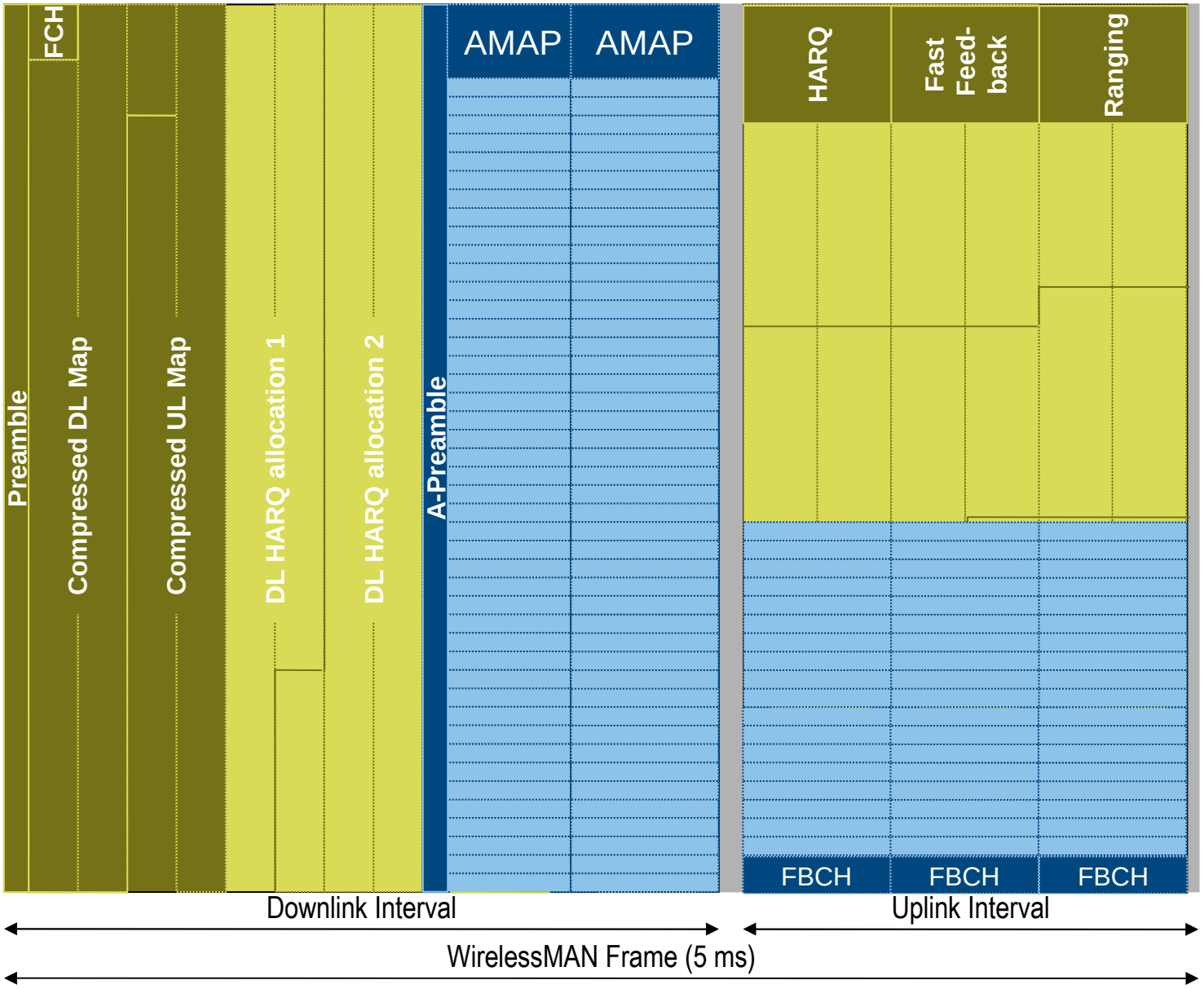
IEEE 802.16m Frame with SFH (10 MHz)



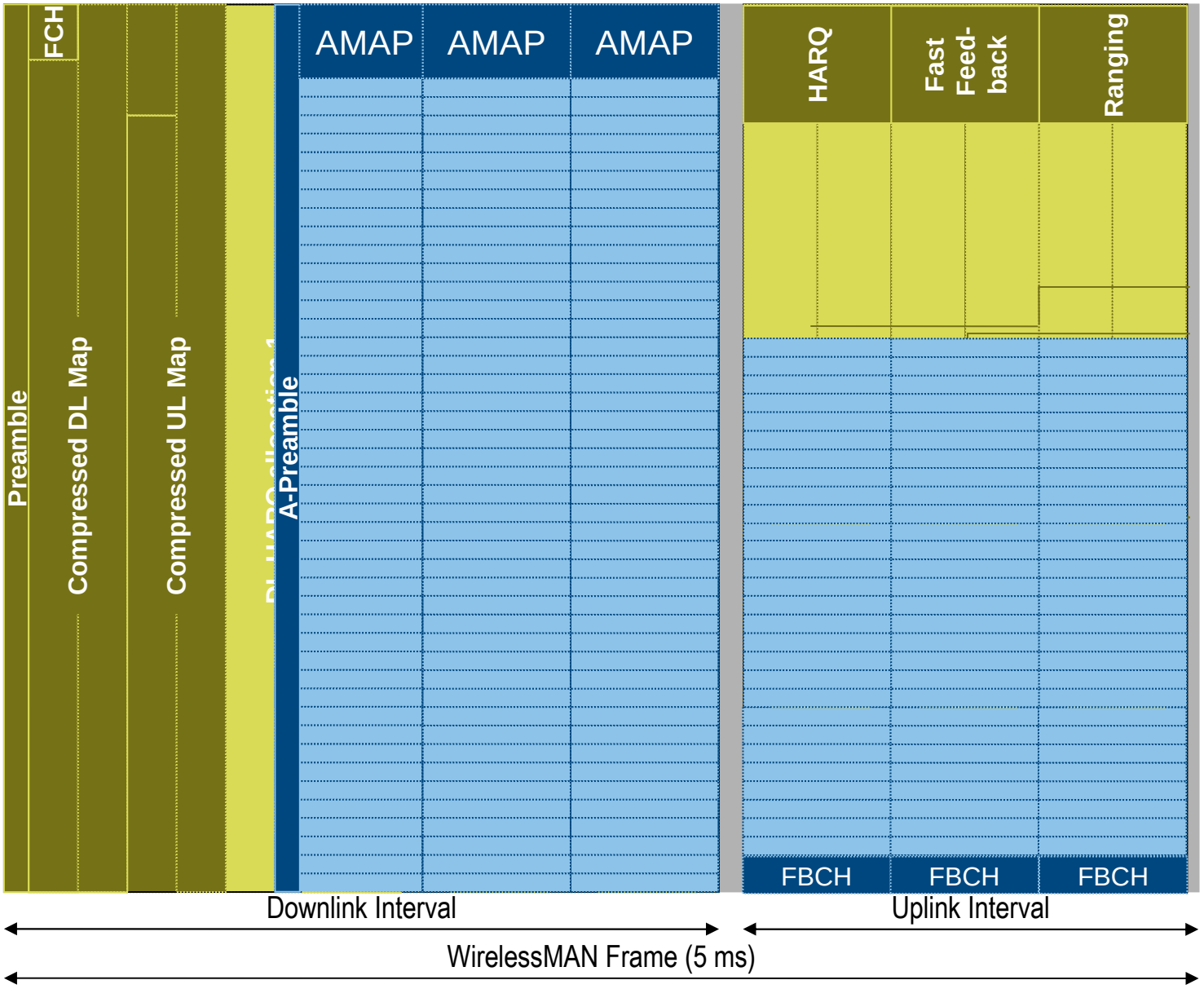
WirelessMAN-OFDMA Support (one 16m subframes)



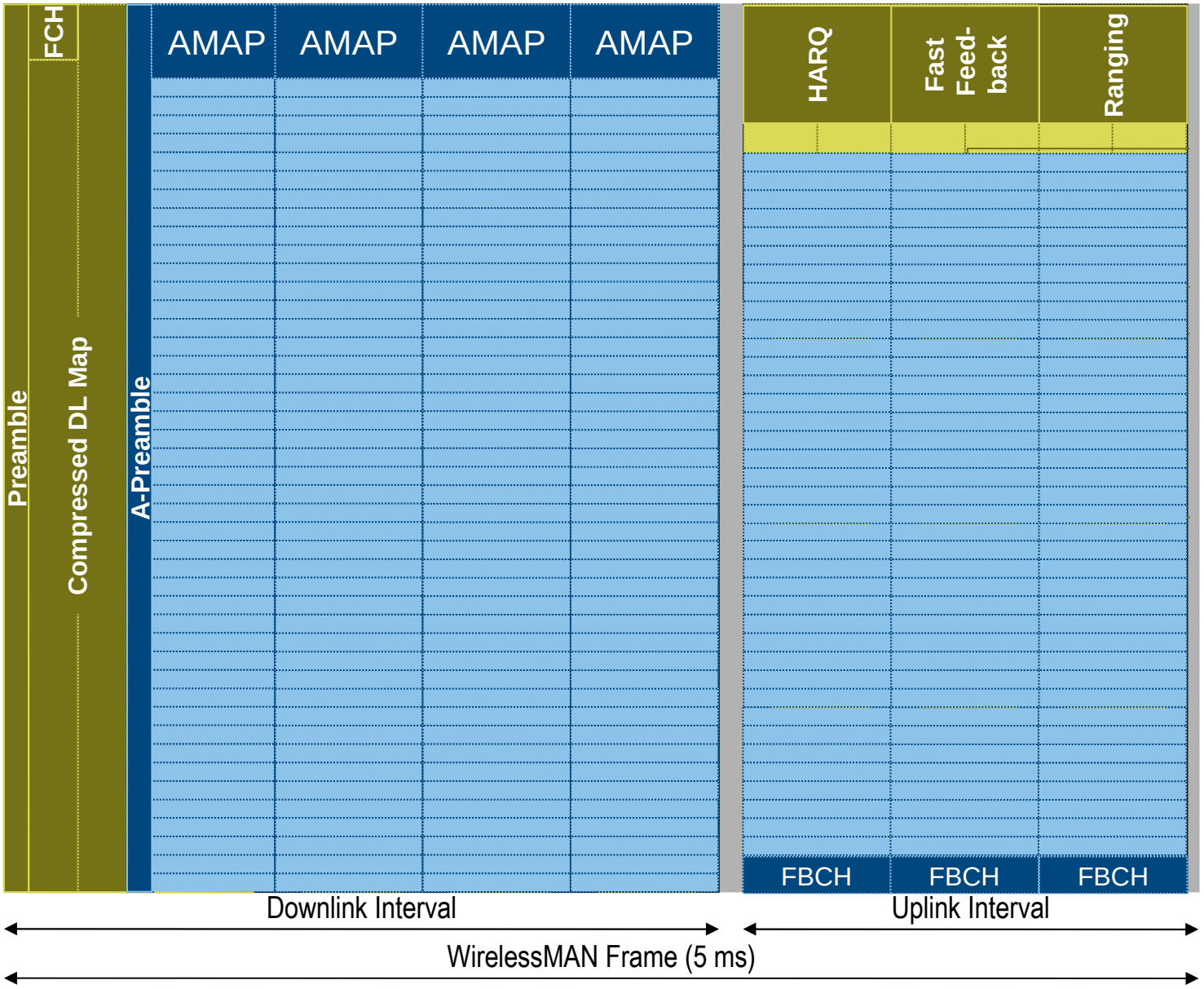
WirelessMAN-OFDMA Support (two 16m subframes)



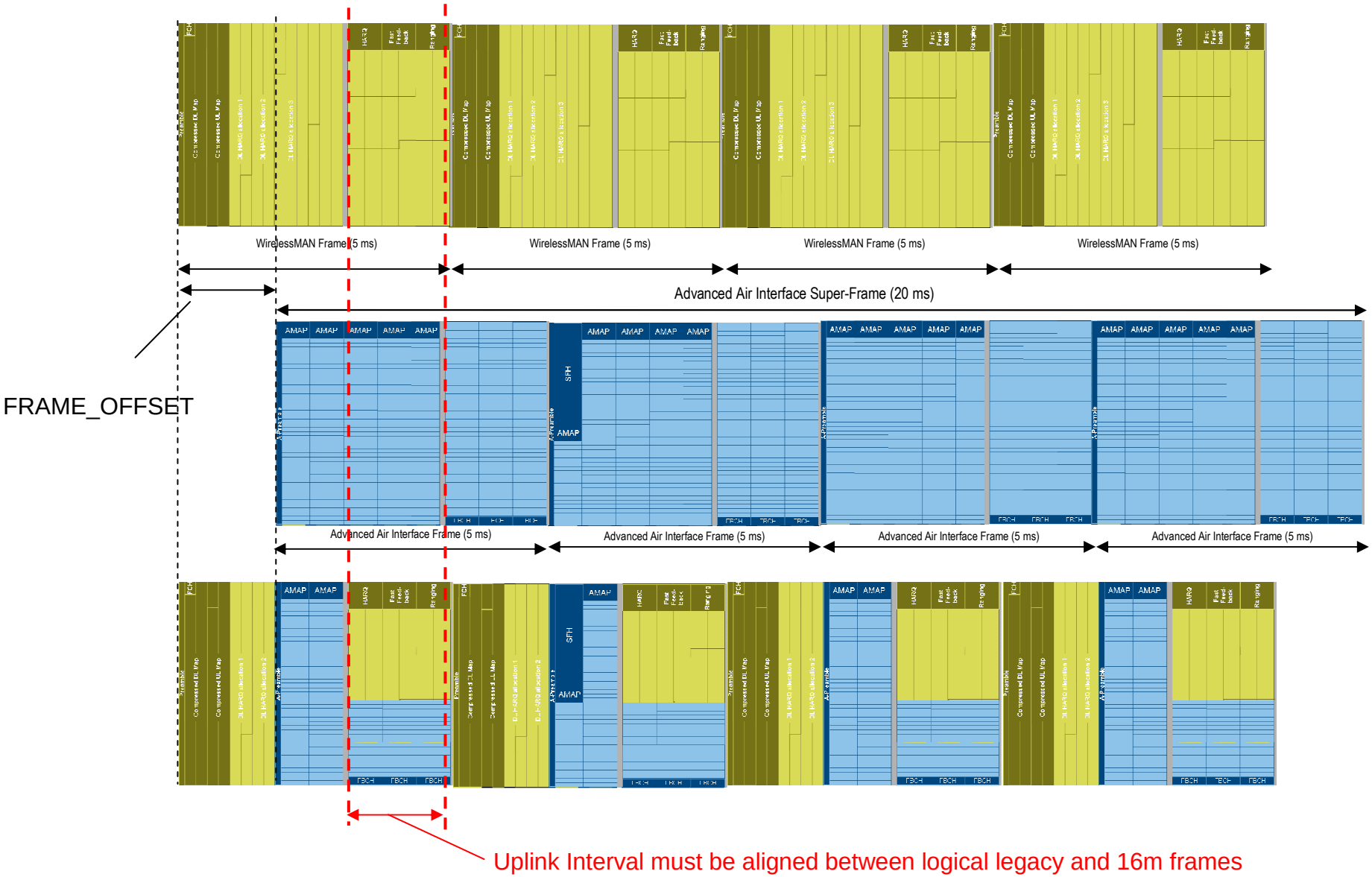
WirelessMAN-OFDMA Support (three 16m subframes)



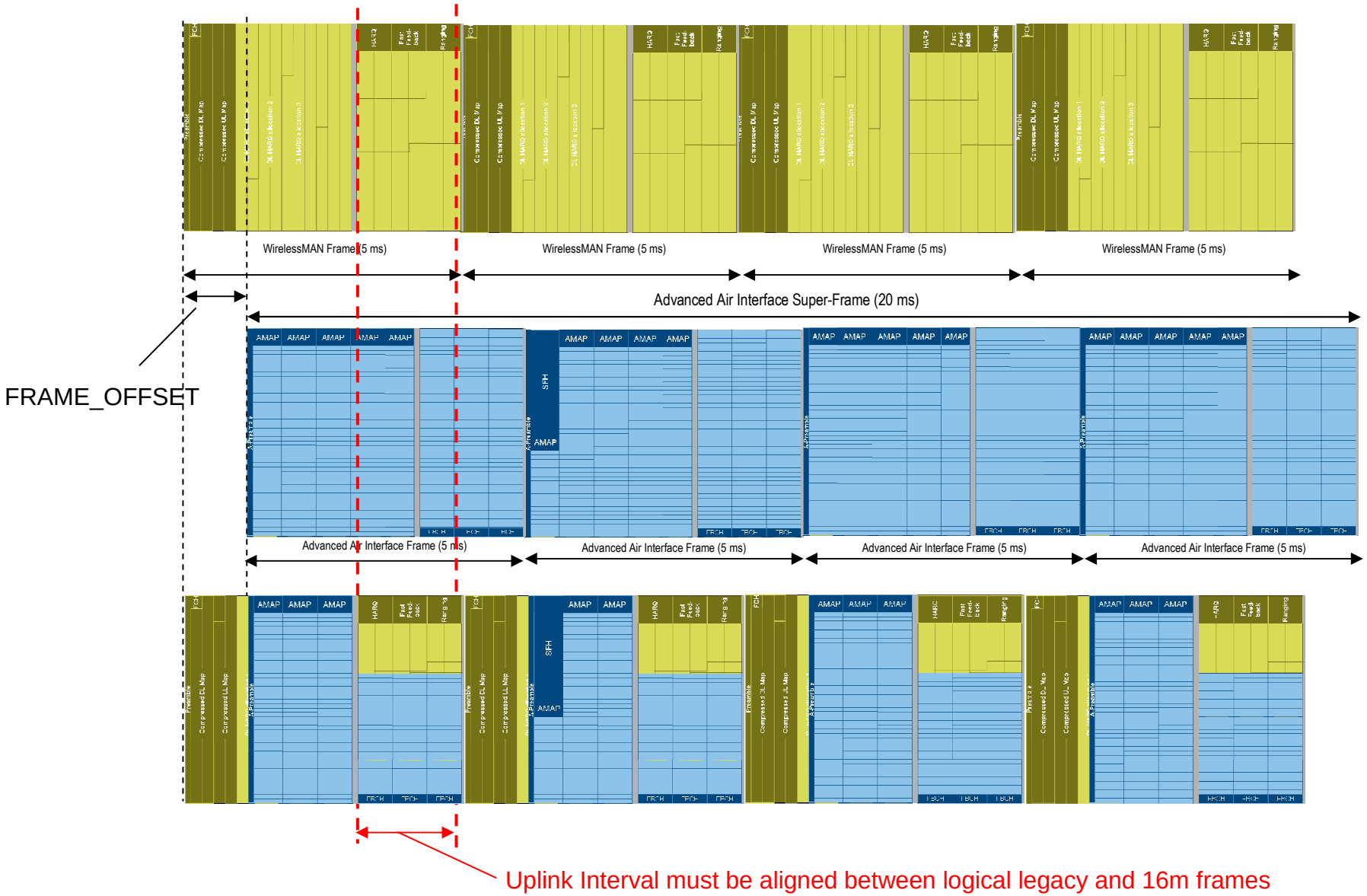
WirelessMAN-OFDMA Support (four 16m subframes)



Superframe Structure
Co-existence on the same carrier
(FRAME_OFFSET = 3)

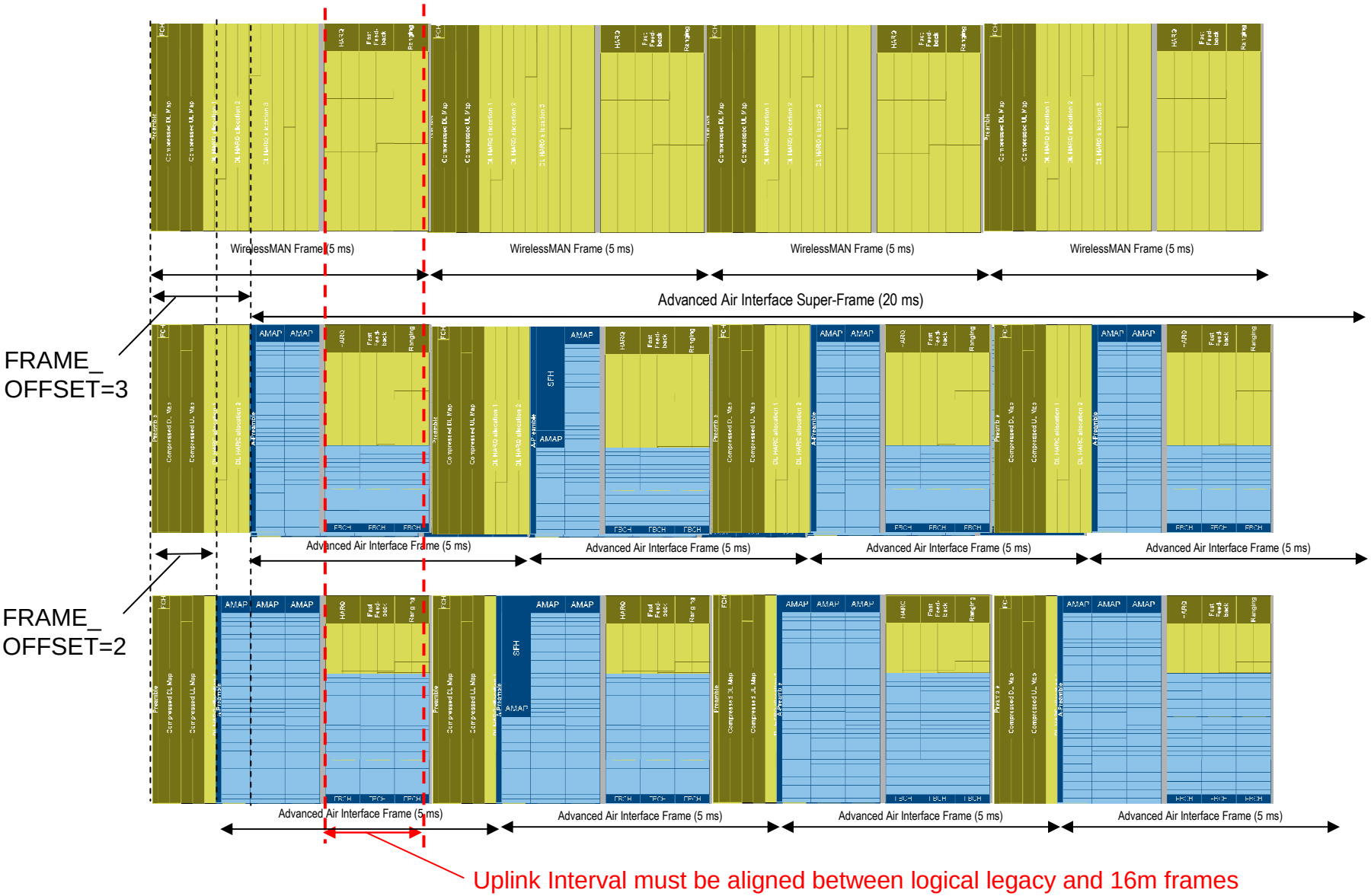


Superframe Structure
Co-existence on the same carrier
(FRAME_OFFSET = 2)



Superframe Structure

Changes in the 16m:16e ratio force a shift in the 16m timing

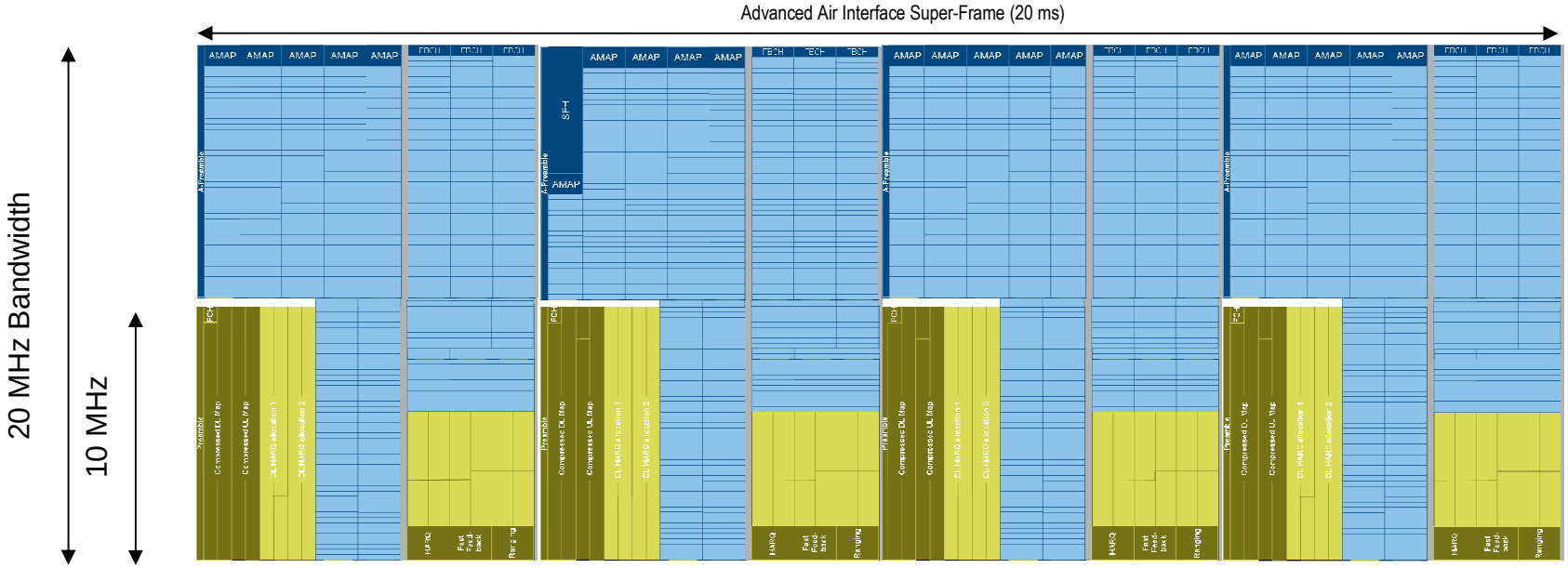


Comments

- ***Implications of existing legacy support***
  - ***16m zone/Legacy zone must be system wide***
    - 16m pre-amble must be aligned across multiple cells
  - ***Changes in the fraction of resources allocated to 16m must be coordinated system wide***
    - Any increase or decrease in 16m resource will cause a shift in 16m frame timing
  - ***The faction of resources may not match the number of 16m mobiles currently active***
- ***Multicarrier operation also suffers from 16m/16e misalignment***
  - ***The 16m frame subframe is shifted by one symbol depending on whether it is operating in a greenfield deployment or with legacy support***

Multicarrier Coexistence

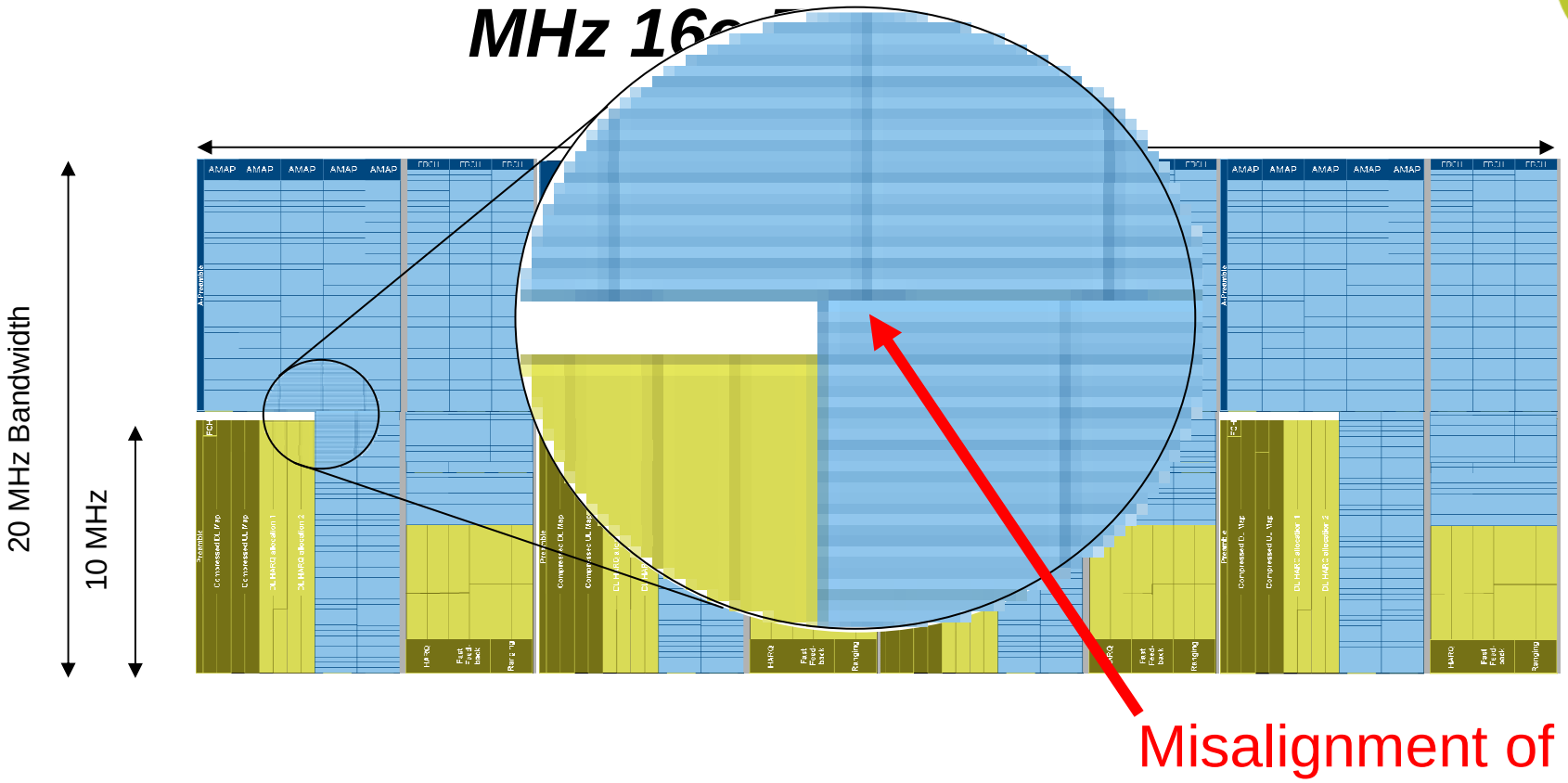
20 MHz 16m Frame with 10 MHz 16e Frame



- ***Difference in subframe timing between legacy mode and greenfield mode causes misalignment between 16m PRUs in each 10 MHz band***

Multicarrier Coexistence

20 MHz 16m Frame with 10 MHz 16m

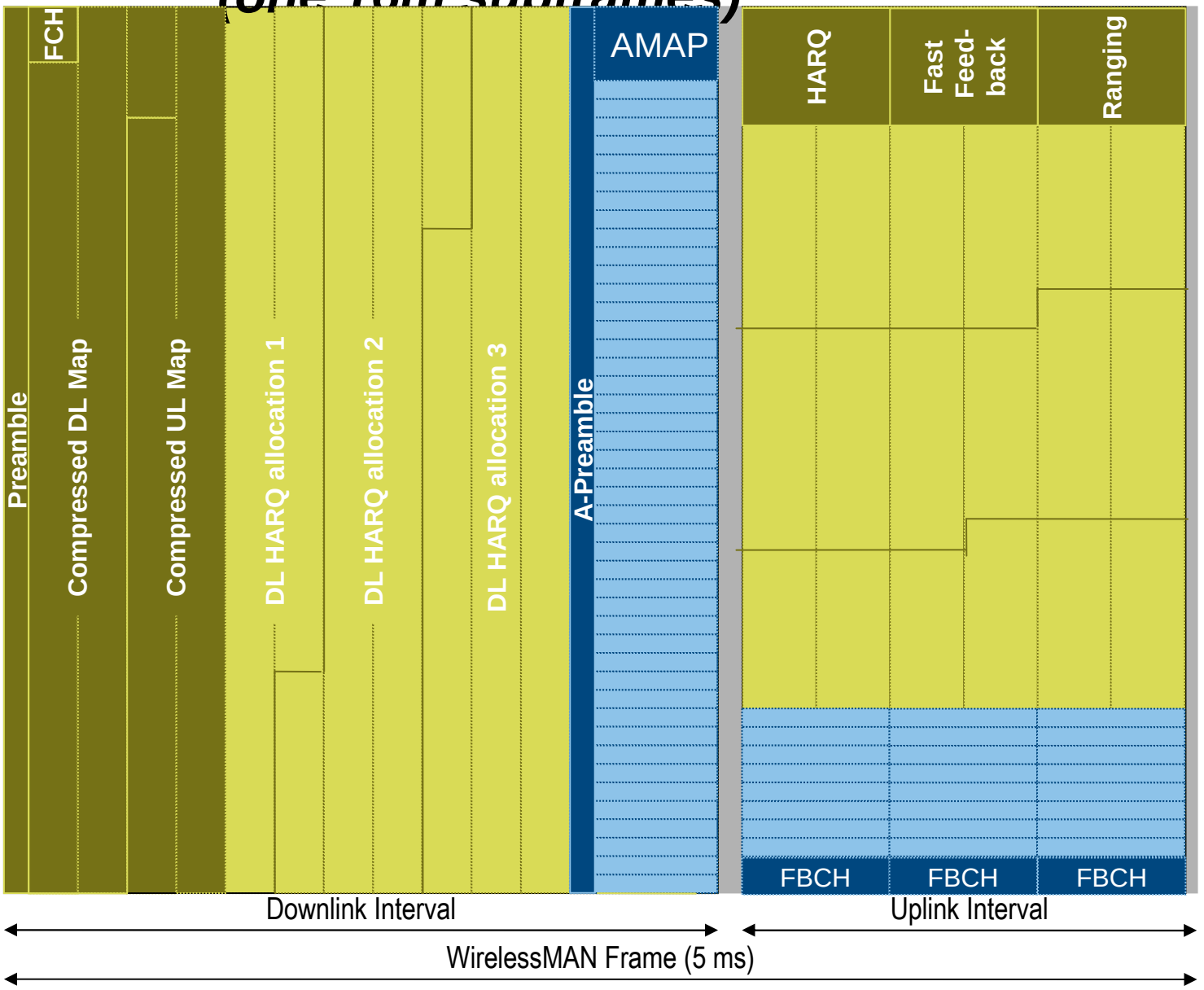


- ***Difference in subframe timing between legacy mode and greenfield mode causes misalignment between 16m PRUs in each 10 MHz band***

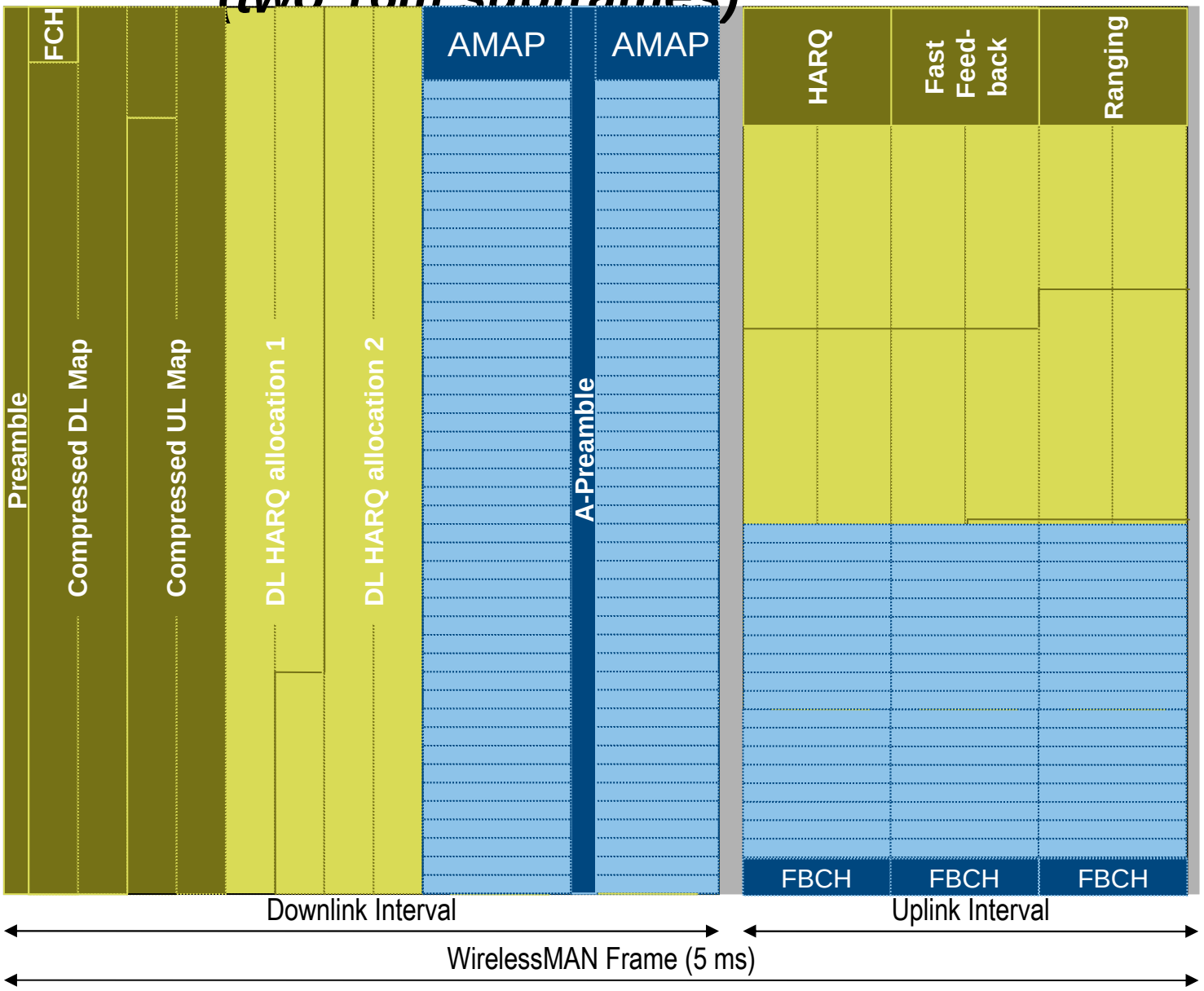
Proposed Remedy

- ***Fix the offset of the preamble based on the TDD split***
  - ***Downlink ratio defines the Frame_Offset***
    - TDD 4:4 => Frame_Offset = 4
    - TDD 5:3 => Frame_Offset = 3
    - TDD 6:2 => Frame_Offset = 6
- ***Additional downlink subframes will precede the downlink subframe carrying the 16m preamble***
  - ***The 16m downlink region may expand dynamically to the left***
  - ***The 16e downlink region may expand dynamically to right***
  - ***The 16m uplink region may expand dynamically from the bottom***
  - ***The 16e uplink region may expand dynamically from the top***
- ***Next slides illustrate the operation for TDD***

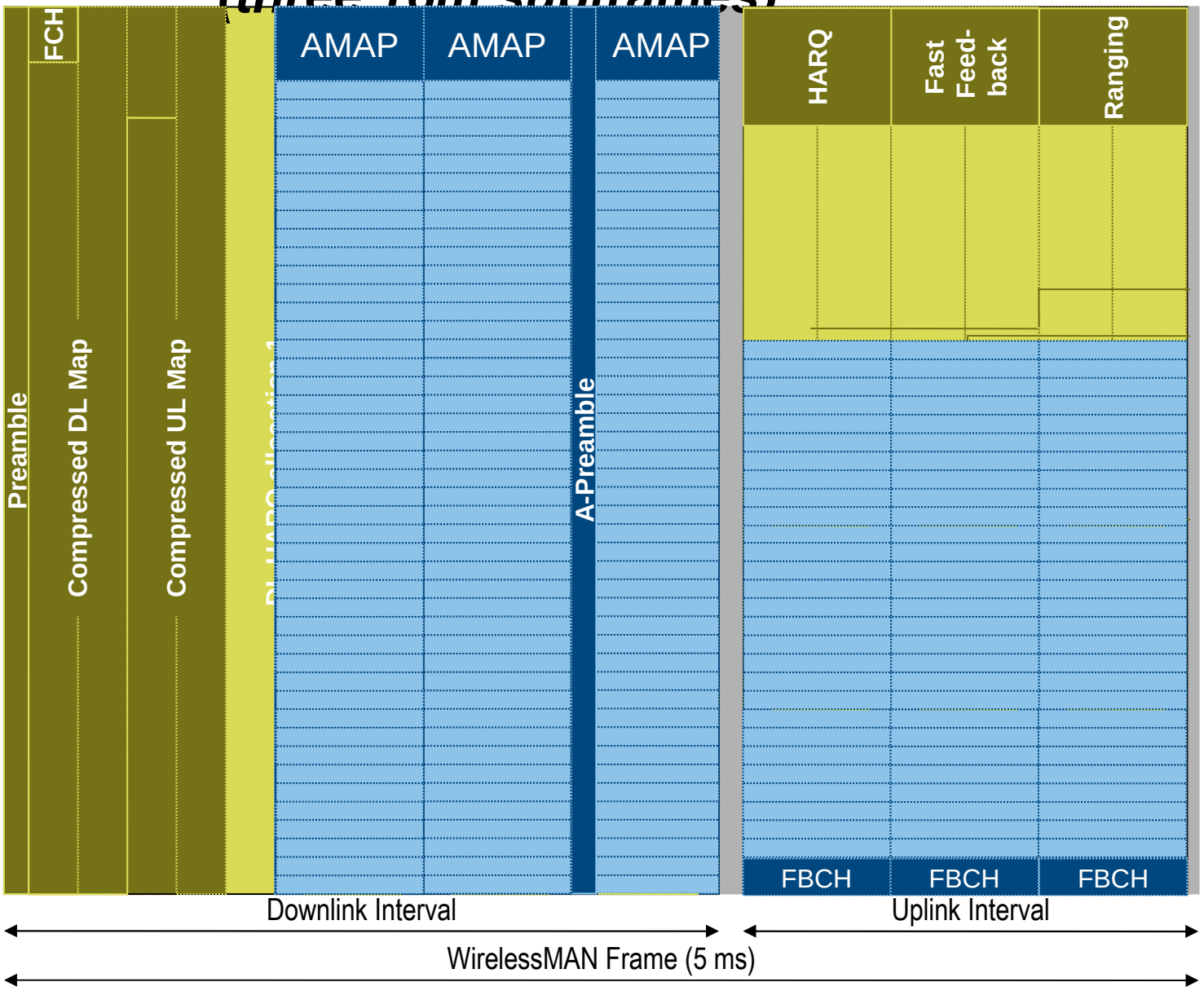
Proposed WirelessMAN-OFDMA Support (one 16m subframes)



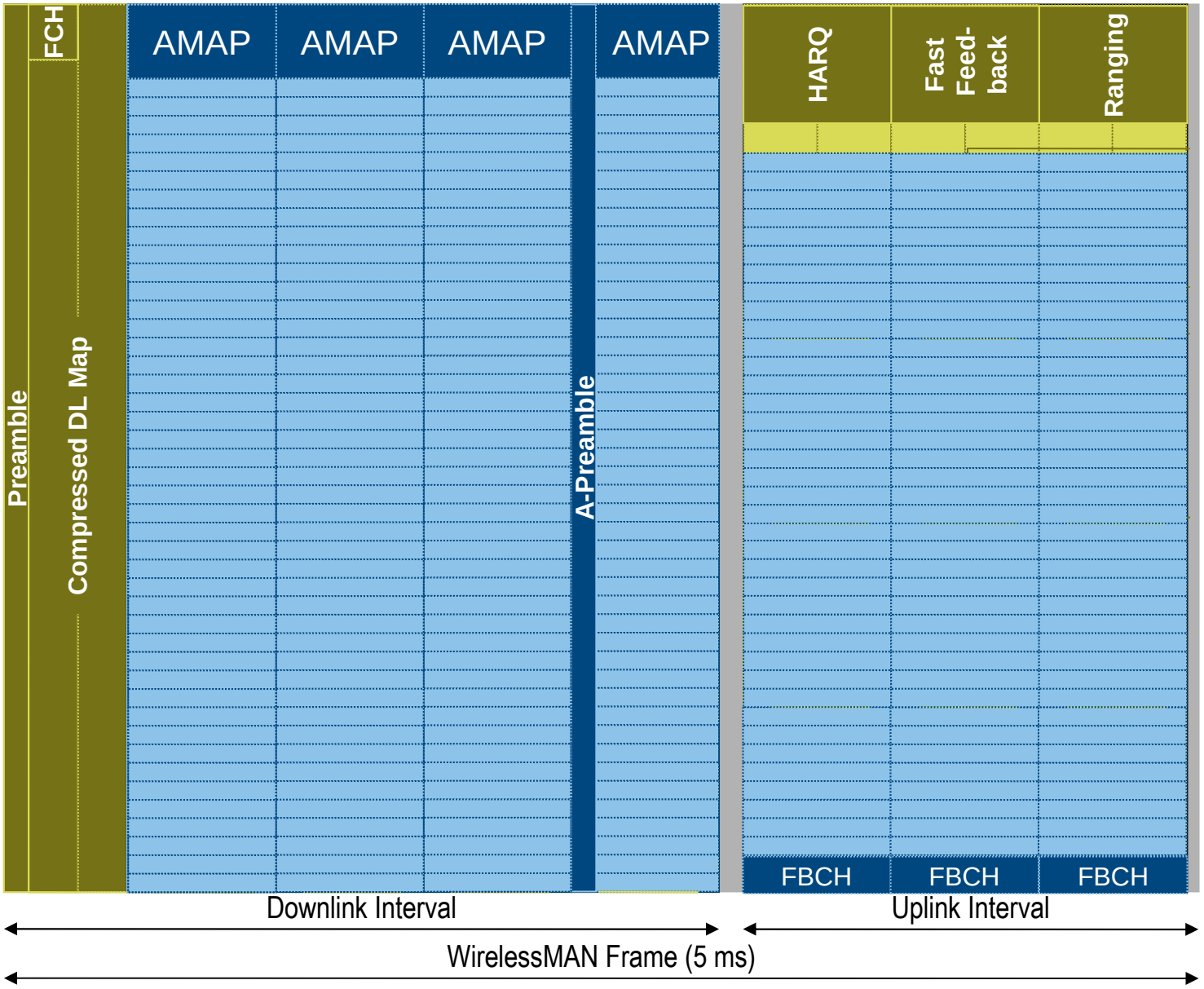
Proposed WirelessMAN-OFDMA Support (two 16m subframes)



Proposed WirelessMAN-OFDMA Support (three 16m subframes)



Proposed WirelessMAN-OFDMA Support (four 16m subframes)



Proposed Text Changes

- ***See associated contribution for detailed text changes:***
  C80216m-09_2310.pdf