

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	HARQ protocol timing in IEEE 802.16m	
Date Submitted	2008-05-05	
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Re:	IEEE 802.16m-08/373: Call for Contributions on Project 802.16m System Description Document (SDD). Target topic: "HARQ".	
Abstract	This contribution proposes a high level HARQ operation	
Purpose	For discussion and approval by TGm	
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802.16m Basic Frame Structure

This Contribution discusses HARQ timing, ACK/NAK feedback offsets and HARQ feedback method for the basic frame structure as defined in SDD

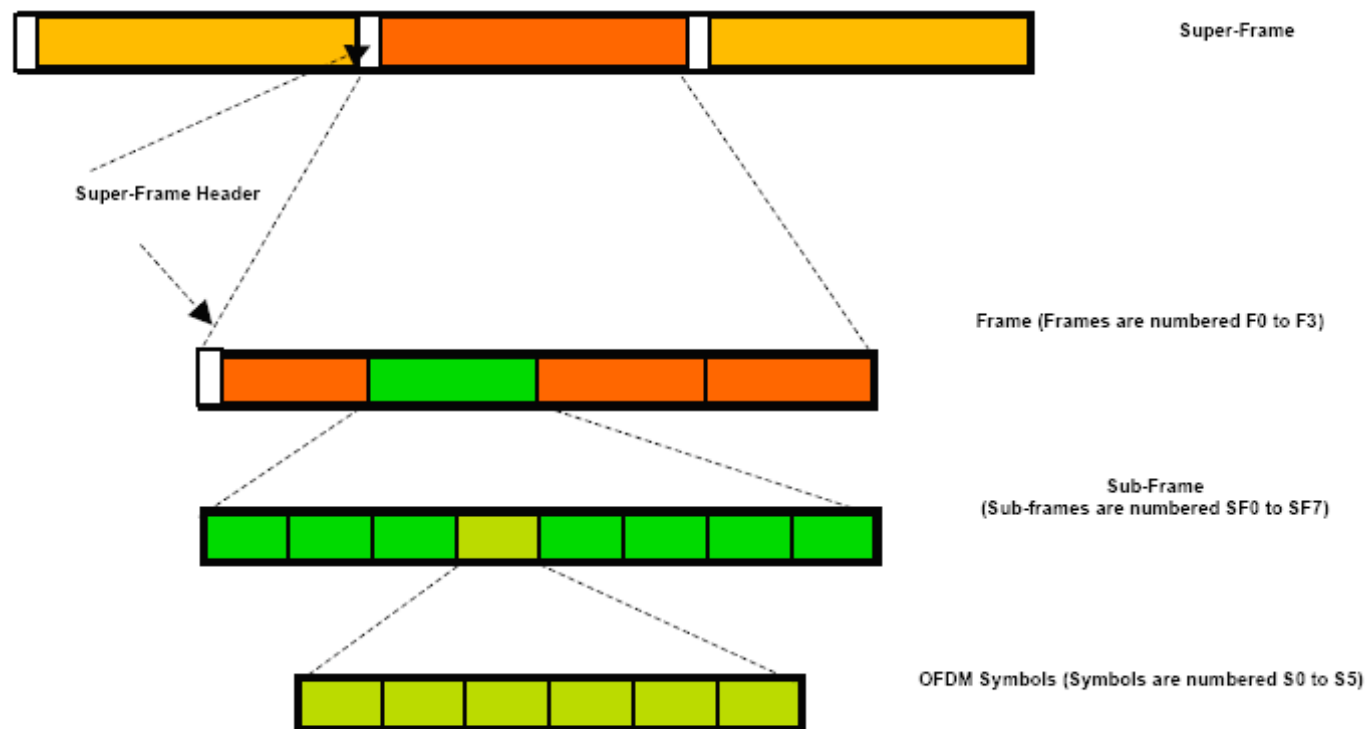
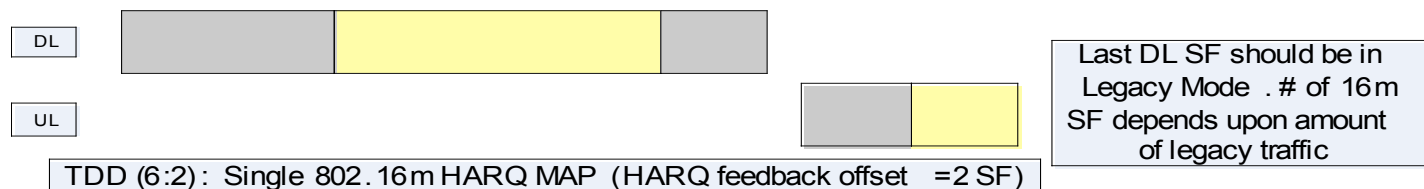
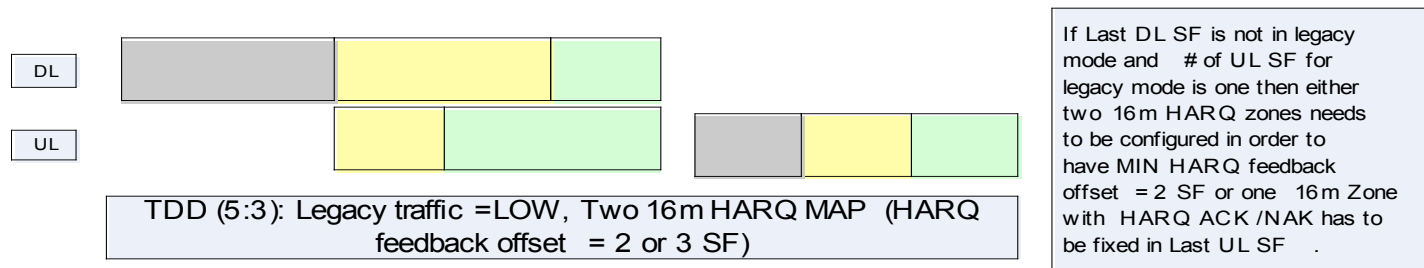
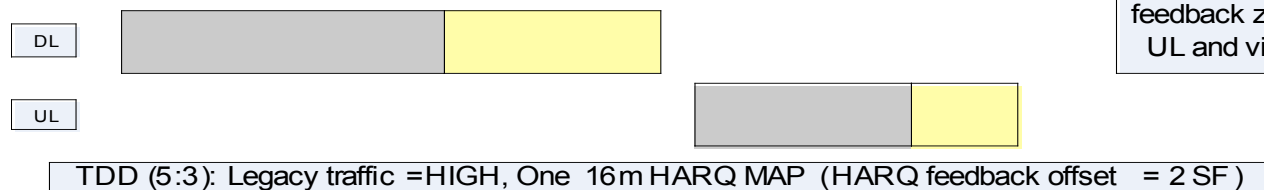
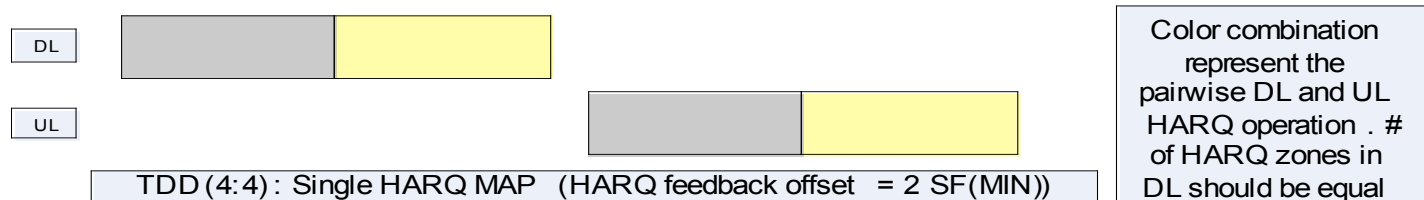
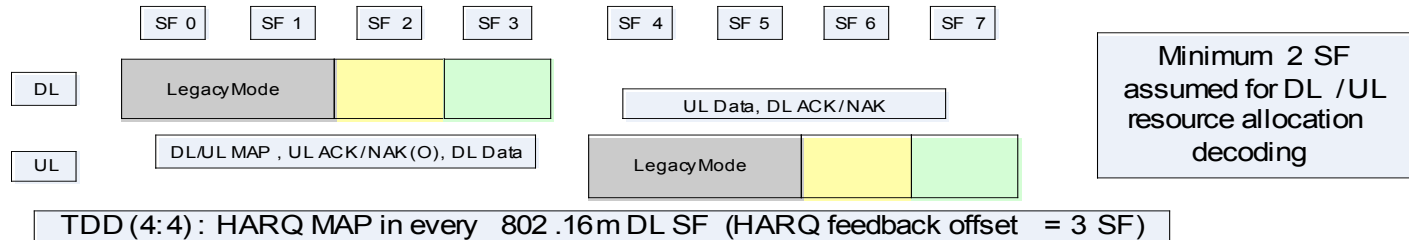


Figure 11.4-1: Basic frame structure

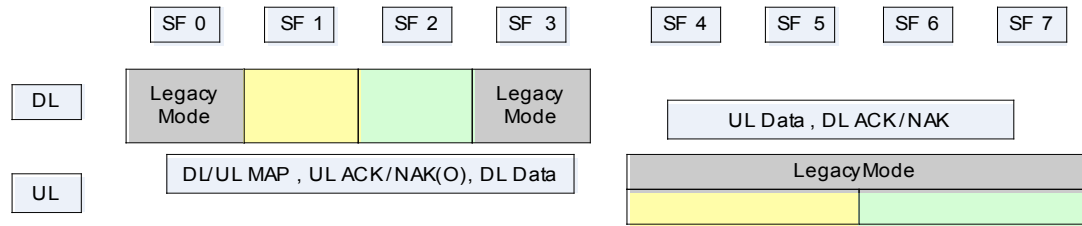
Background

- In 802.16e, HARQ feedback offset is fixed for all types of MSs. However, the decoding capabilities of different types of MS may be different.
- Latency requirements of different types of traffic is also different.
- In 802.16m, it is not necessary to have a resource allocation information in every sub-frame. Sub-frames may be concatenated.
- Therefore, IEEE 802.16m should provide support for variable HARQ feedback offset, when possible.
- Following slides represents the sub set of possibilities for HARQ timing in TDD/FDD mode with or without legacy support.

HARQ timing and feedback offset in 802.16m TDD with legacy support (UL – TDM)

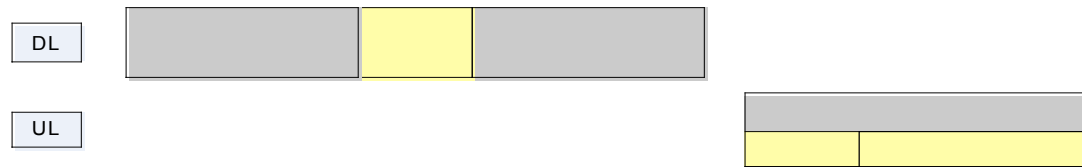


HARQ timing and feedback offset in 802.16m TDD with legacy support (UL – FDM)



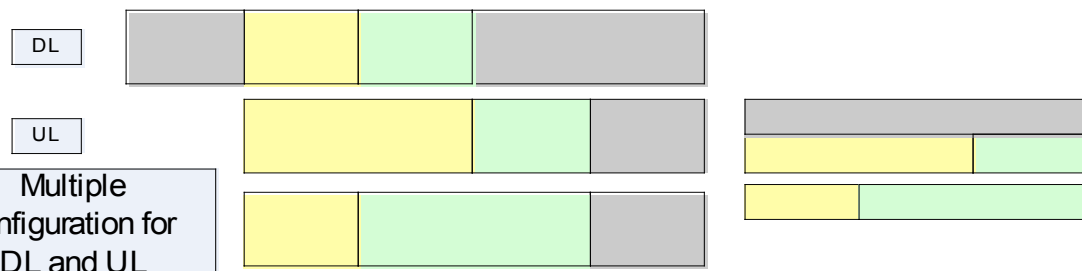
TDD (4:4): HARQ MAP in every 802.16m DL SF (HARQ feedback offset = 2 SF)

In Order to have MIN HARQ feedback offset = 2, either insert Legacy DL SF at the end of DL frame or fix the HARQ ACK / NAK offset in the corresponding 2nd UL SF . # of 16m SF depends upon amount of legacy traffic .



TDD (5:3): Legacy traffic =HIGH, One 16m HARQ MAP (HARQ feedback offset = 2 SF)

If # of 16m DL HARQ zone is one , then last two DL SF should be in Legacy Mode . # of 16m SF depends upon amount of legacy traffic .



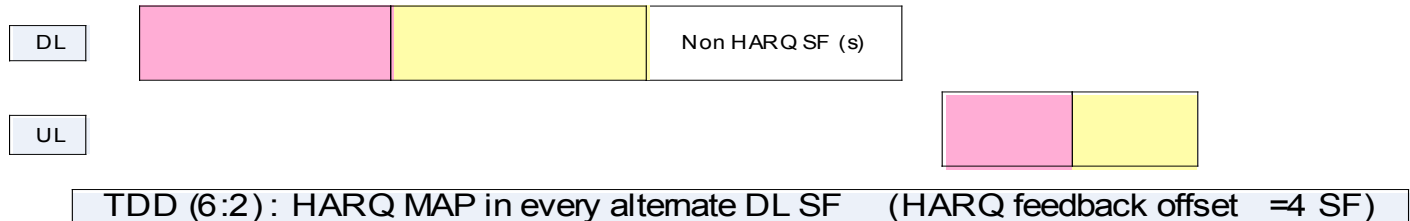
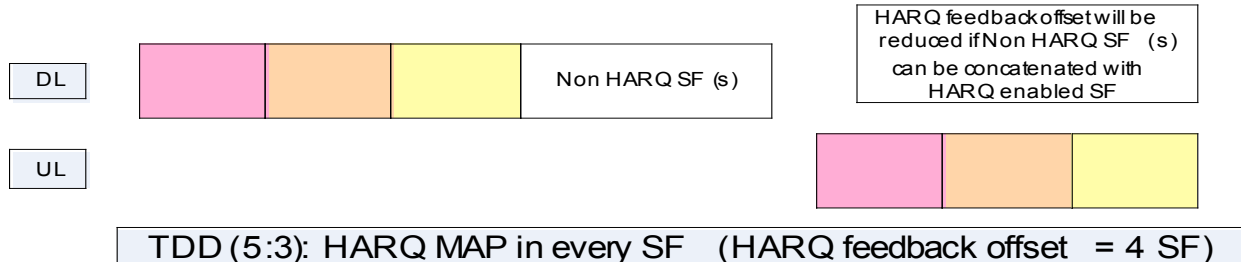
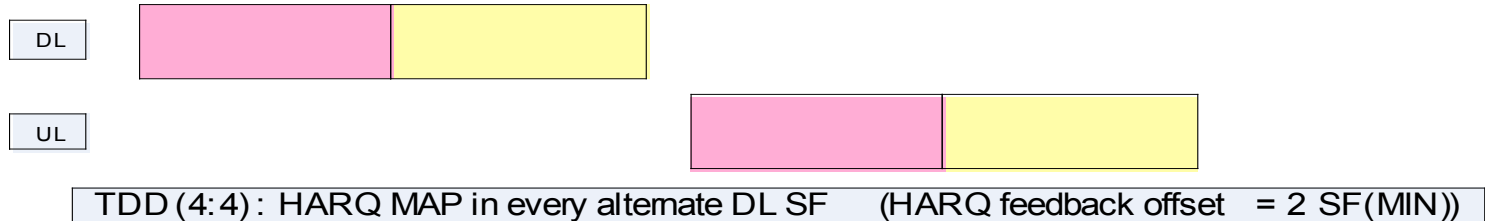
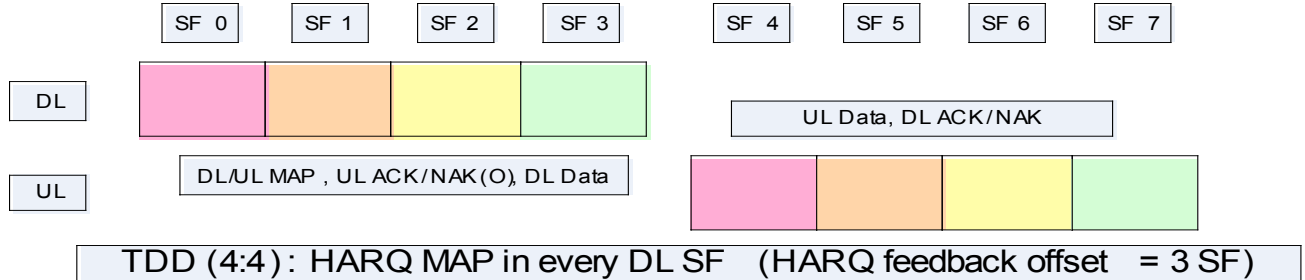
Multiple Configuration for DL and UL

TDD (5:3): Legacy traffic =HIGH, One 16m HARQ MAP (HARQ feedback offset =2 or 3 or 4 SF)

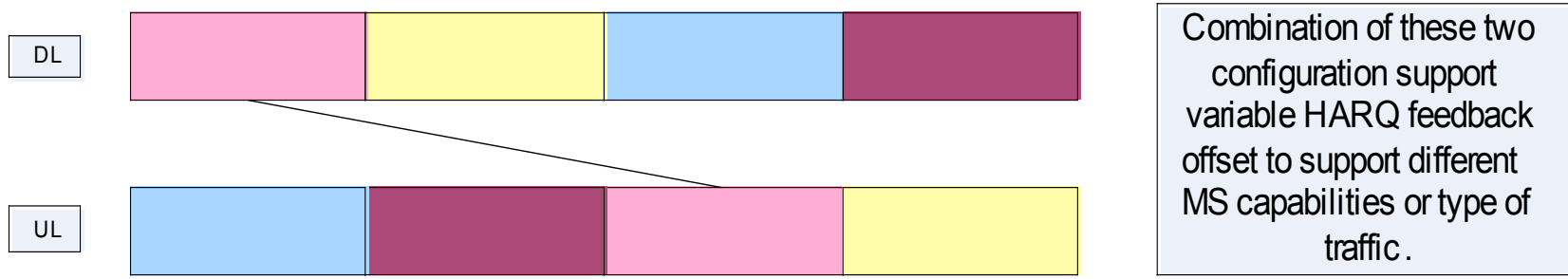
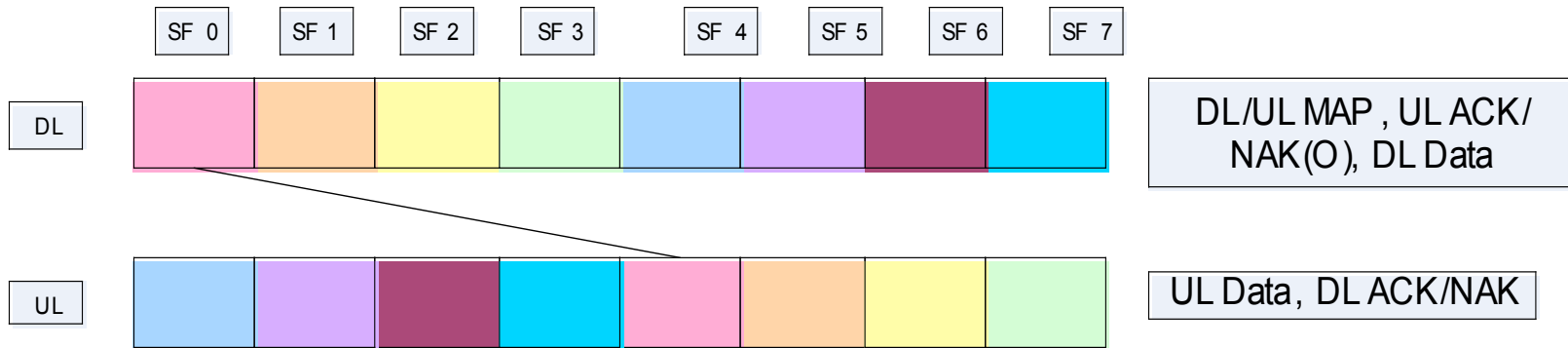
Having multiple 16m HARQ Zone provide variable HARQ feedback offset to support different capabilities of MS

TDD (6:2) : Similar configuration options as 5:3 split

HARQ Timing and feedback offset in 802.16m TDD mode



HARQ timing and feedback offset in 802.16m FDD



H-FDD MS can be supported with above configuration

HARQ ACK Channel multiplexing Method

- HARQ ACK Channel can be TDM/FDM or CDM
- TDM/FDM
 - Scalable
 - # of HARQ ACK channels depends on # of HARQ burst
 - Resource allocation
 - Joint coding
 - MS follows the order in which HARQ allocations are transmitted.
 - Separate coding
 - MS can not find its own location based on ordering
 - Require specific ACK channel index position
- CDM
 - All users transmits orthogonal codes in the same location.
 - Not scalable
 - HARQ ACK region granularity does not depends on # of HARQ burst. Resource wastage if # of transmitted HARQ burst are less.

Conclusion

- When UL is FDM, “legacy zone” may be required at the end of DL sub-frame in order to maintain MINIMUM HARQ feedback offset.
- HARQ ACK/NAK feedback offset can be fixed or variable
- Variable HARQ ACK/NAK feedback offset can support different MS capabilities and traffic types.
- HARQ ACK/NAK feedback offset either can be indicated in the sub-frame where data is transmitted or in the sub-frame configuration information in the super-frame.
- Propose to have HARQ ACK channel as TDM/FDM.

Proposed Text to be included in SDD

11.X HARQ Protocol

11.x.1 HARQ protocol timing

[insert slides 4 to 7 here]

11.x.2 HARQ feedback offset

HARQ ACK/NAK feedback offset can be fixed or variable .Variable HARQ ACK/NAK feedback offset can support different MS capabilities and traffic types. HARQ ACK/NAK feedback offset is indicated in the sub-frame configuration information in the super-frame.

11.x.3 HARQ ACK Channel multiplexing method

HARQ ACK Channels are TDM/FDM.