Assignment of Pilots for Uplink in 802.16 OFDMA PHY

IEEE 802.16 Presentation Submission Template (Rev. 8.21)

Document Number:

IEEE S802.16a-02/34

Date Submitted:

2002-03-08

Source:

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Venue:

802.16 meeting, 11~16 March, 2002, St Louis, MI

Base Document:IEEE C802.16a-02/34

Purpose:

This presents an optional way of pilot assignment for OFDMA PHY

Assignments of Pilots for Uplink in 802.16 OFDMA PHY

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INTRODUCTION

Assumption : OFDMA 2048 FFT UL mode / # of subchannel : 32

Conven-tional	# of Data carriers / subch.	48
	# of Pilots / subch.	**5 (1:const., 4: var.)**
Proposed	# of Data carriers / subch.	48
	Available # of Pilots / subch.	**5 ~ max. 5x32 (1:const., #: var.)**

Increase of pilots per subchannel

It's effective in deep fading environment

Exact phase/frequency estimation can be done

High system performance is expected.

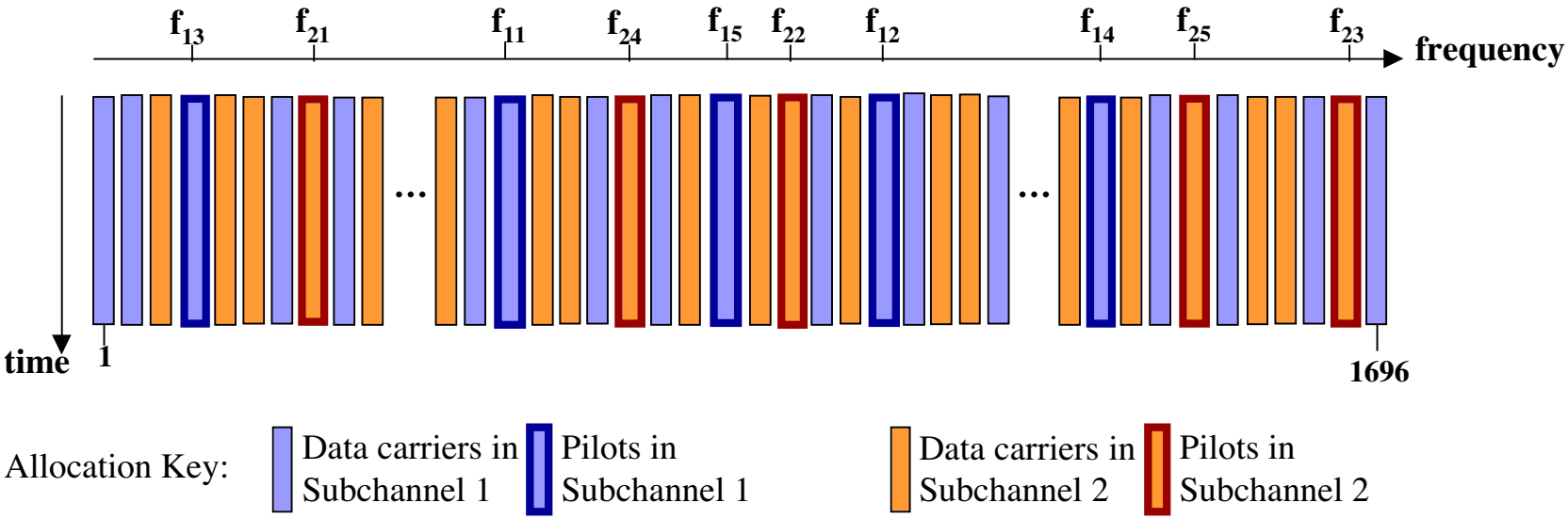
Assignment of Pilots

1. 2048 FFT

   : N_{used}(1696) = Subchannels(32) x {Data carriers(48) + Pilots(5)}

   : just 2 subchannels are shown below

2. f_{mn} : n_{th} (n=1,…,5) pilot in the m_{th} (m=1,…,32) subchannel



Share of Pilots –BASIC scheme

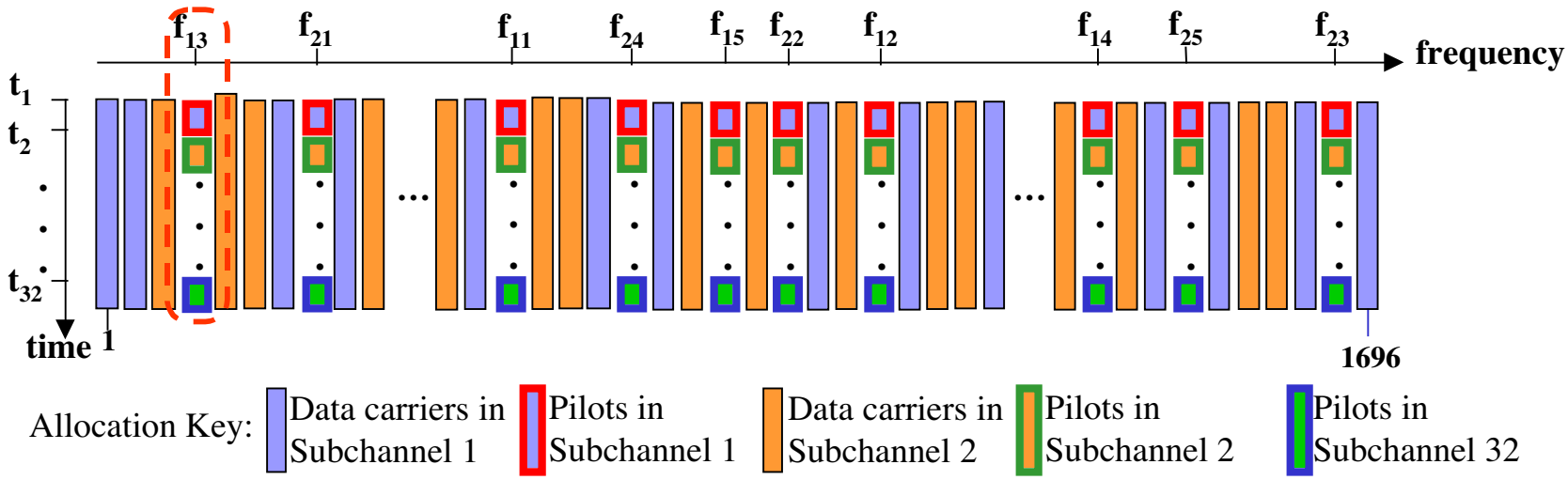
1. All subchannels can share pilots from all subchannels.

- At specific time(random/const.) pilots can be accessed.

  - t_m : pilot access time of the m_{th} subchannel

- # of pilots per subchannel : 5 -> max. 5*32
- Total amount of pilots do not increase.

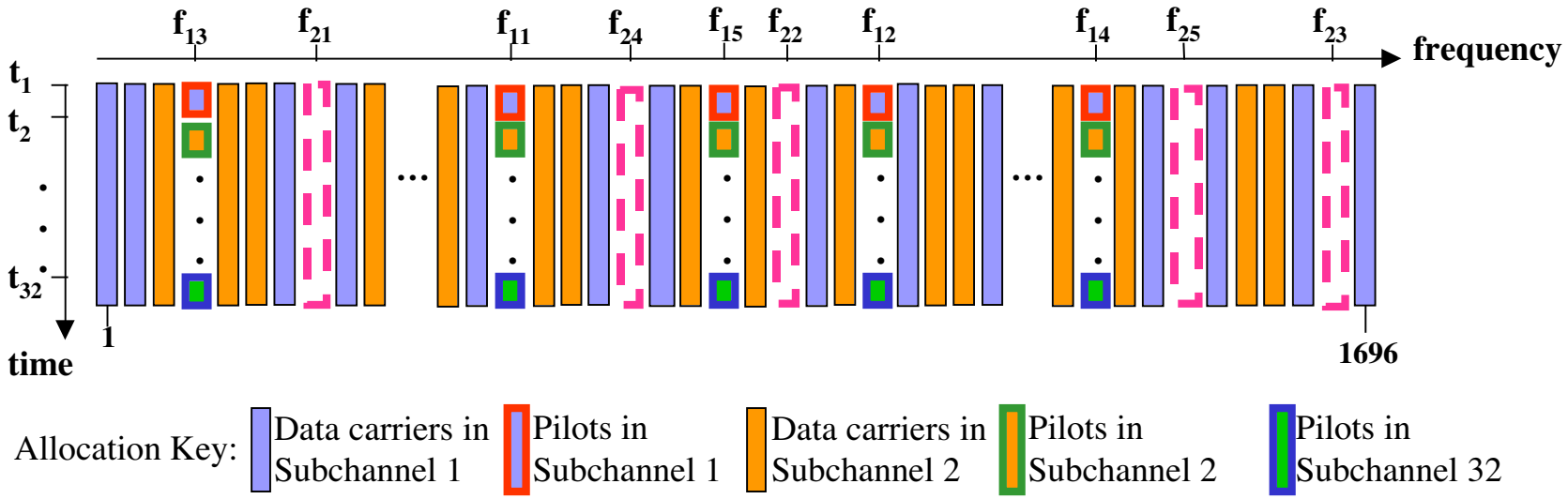
5. Phase & frequency estimation enhancement



Share of Pilots – Scheme 2

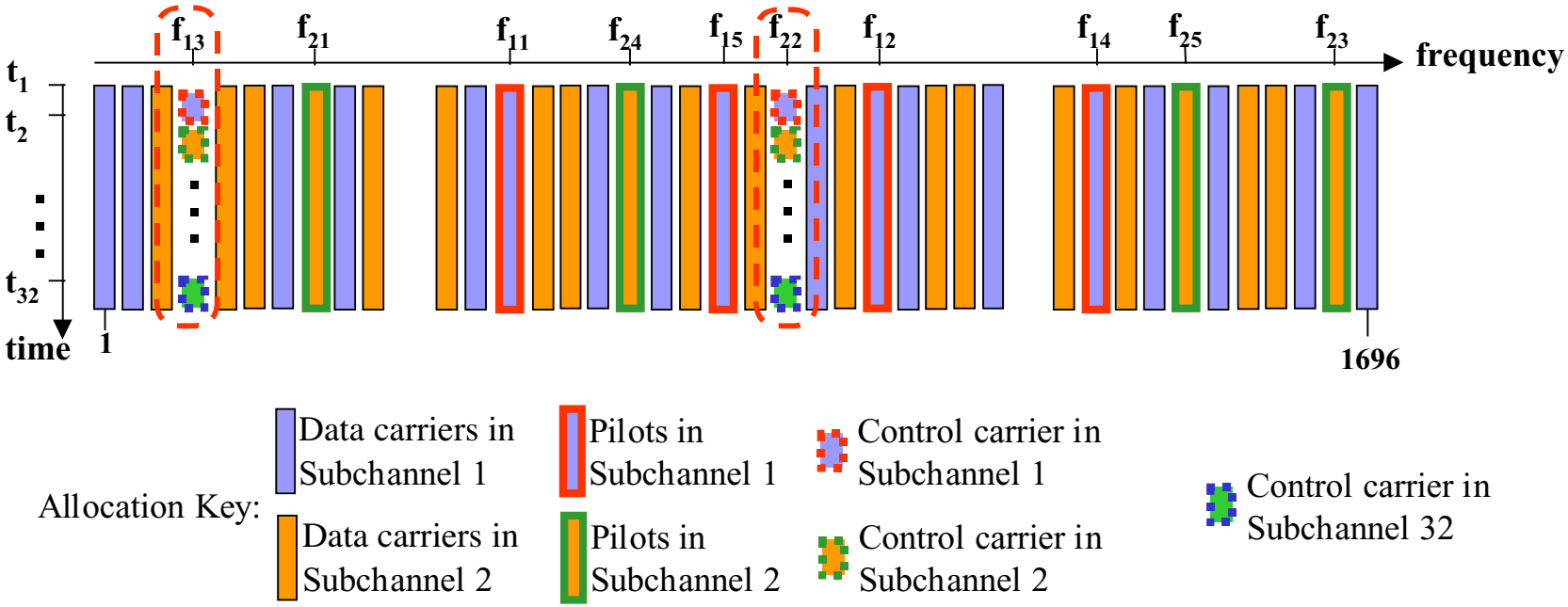
- All subchannels share pilots from a single(1~32,const.) subchannel.
- At specific time(random/const.) pilots can be accessed.
- Blank carrier
  - data/retransmission, power control signals, etc.

4. # of pilots per subchannel : 5 -> 5
   - Total amount of pilots decreases : 5*32 -> min. 5
5. Data transmission throughput / BER enhancement



Share of Pilots – Scheme 3

- A **control carrier** : one of pilots
  - power control information
  - All subchannels share control carriers from all subchannels.
  - At specific time(random/const.) a control carrier can be accessed.
  - t_m : control carrier access time of m_{th} subchannel
  - BER enhancement



Advantages

Scheme1 : Increase of pilots per subchannel

- Deep fading environment
- Frequency/phase estimation enhancement

Scheme 2 : Decrease of pilots over whole subchannels

- Blank carrier usage
- Data throughput increase

Scheme 3 : Control carrier share

- Power control
- BER enhancement

Conclusion

- Pilot share with time scheduling is effective assignment in a condition which needs many pilots.
- The subchannel should access pilots at its access time.
- The blank carrier will carry data, power control informations, and etc.
- The control carrier is for power control
- Frequency/phase estimation enhancement, BER enhancement and data throughput increase are obtained.