

Assignment of Pilots for Uplink in 802.16 OFDMA PHY

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Purpose:

This presents an optional way of pilot assignment for OFDMA PHY

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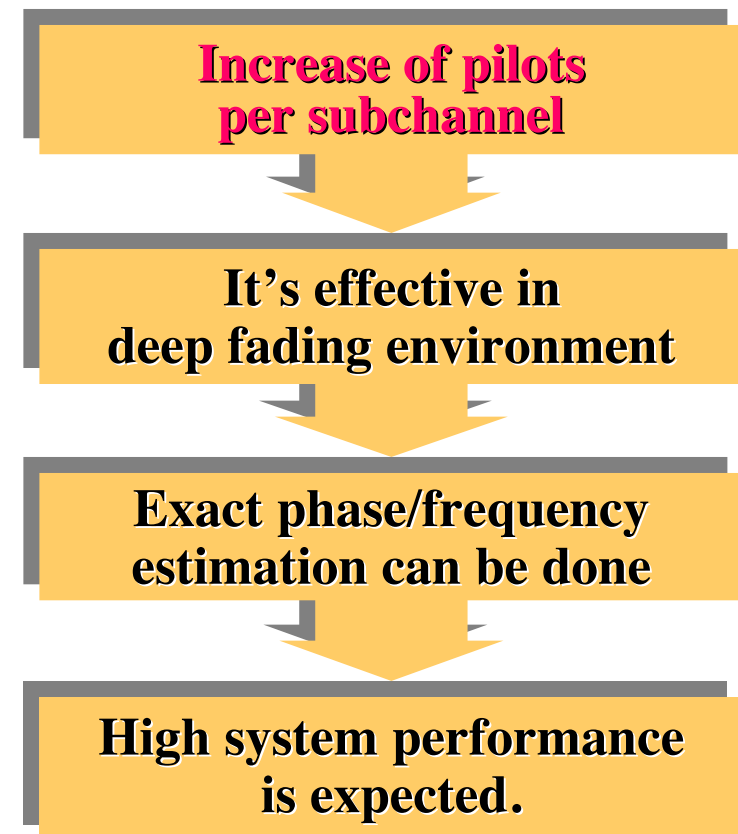
**Assignments of Pilots for Uplink
in 802.16 OFDMA PHY**

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INTRODUCTION

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

Conventional	# 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.)



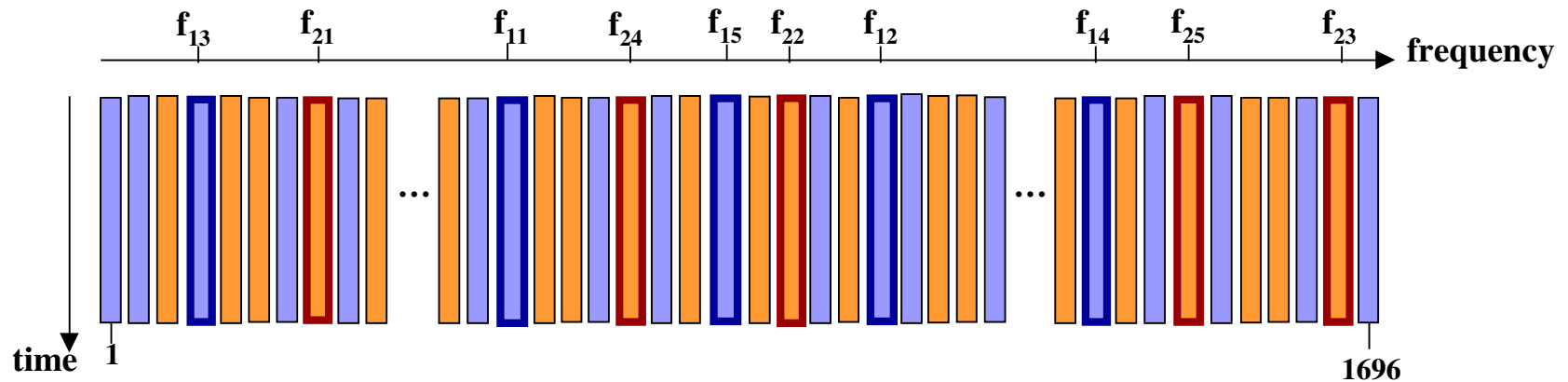
Assignment of Pilots

1. 2048 FFT

: $N_{\text{used}}(1696) = \text{Subchannels}(32) \times \{\text{Data carriers}(48) + \text{Pilots}(5)\}$

: just 2 subchannels are shown below

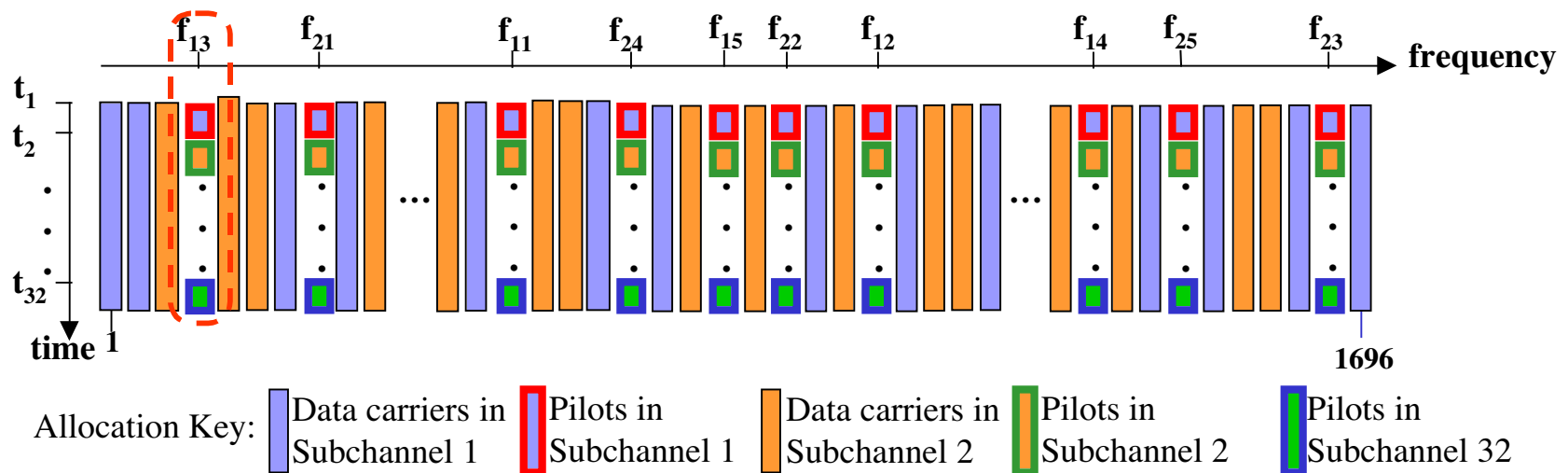
2. f_{mn} : n_{th} ($n=1,\dots,5$) pilot in the m_{th} ($m=1,\dots,32$) subchannel



Allocation Key: Data carriers in Subchannel 1 Pilots in Subchannel 1 Data carriers in Subchannel 2 Pilots in Subchannel 2

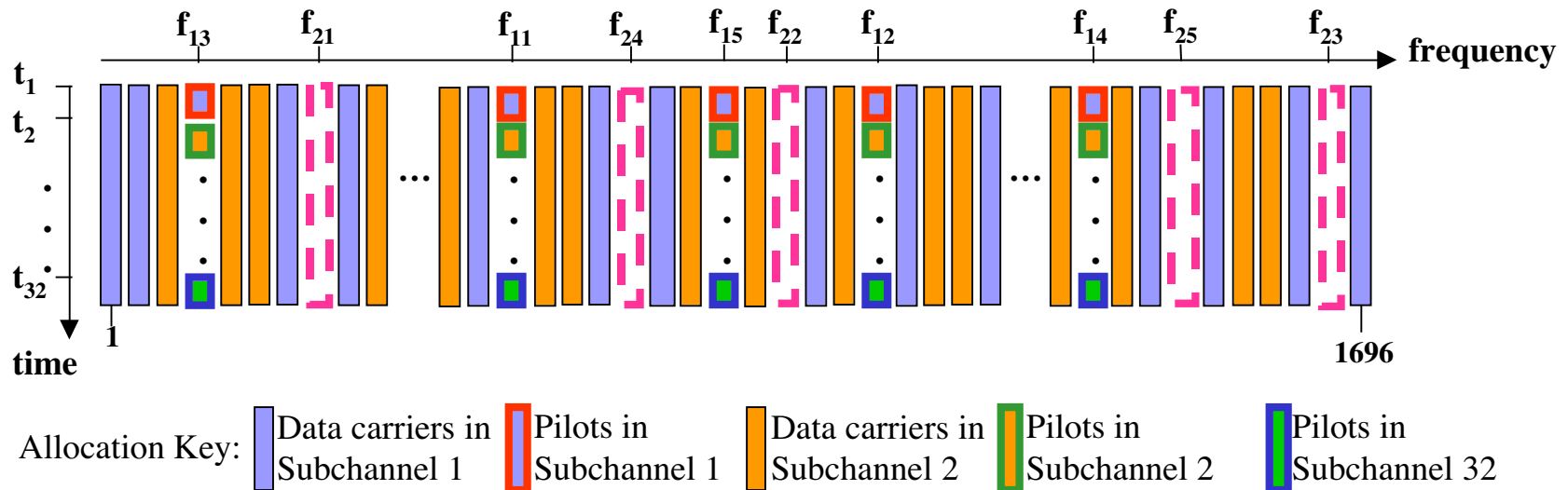
Share of Pilots –BASIC scheme

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



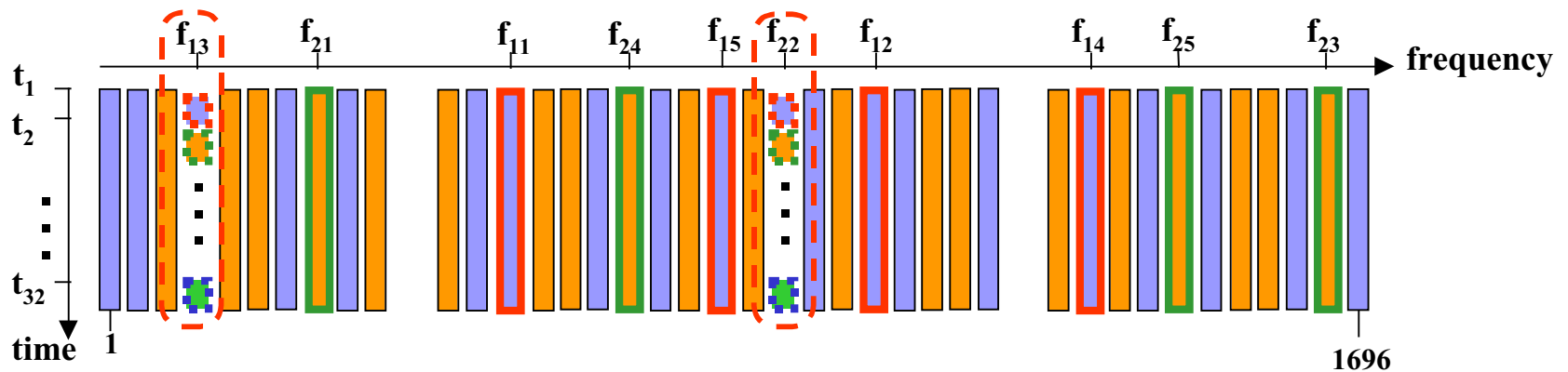
Share of Pilots – Scheme 2

- 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



Allocation Key:

 Data carriers in Subchannel 1	 Pilots in Subchannel 1	 Control carrier in Subchannel 1	
 Data carriers in Subchannel 2	 Pilots in Subchannel 2	 Control carrier in Subchannel 2	 Control carrier in Subchannel 32

Advantages

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Scheme 1 : 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

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- 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.