

Frame structure for IEEE 802.16m

謝雨滔, 許仁源, 丁邦安 / 晶片中心
蕭昌龍/資通所

2007/07/11

1/9

Introduction

- 其 New standard 802.16m is being developed for next generation wireless communication
 - Enhanced spectrum efficiency
 - Higher speed
- 其 Backward compatibility
 - 802.16m shall be backward compatible with legacy system 802.16e
 - Systems based on IEEE 802.16m and 802.16e systems 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.
- 其 It is necessary to devise the frame structure of 802.16m frame supporting backward compatibility

Proposed structure A

Frequency planning

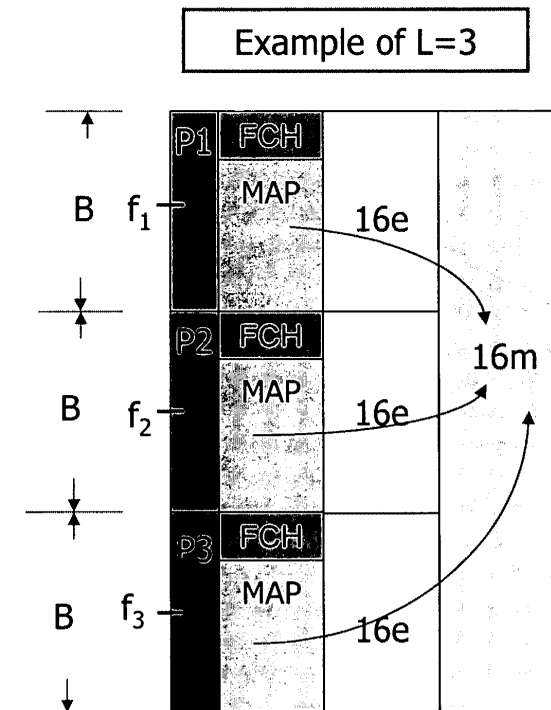
- Occupy the same band class as 802.16e
- A 802.16m channel uses multiple (L) contiguous 802.16e channels
- L BS's share the same 802.16m zone with $L*B$ bandwidth (802.16e BW with B)

Backward compatibility

- 16e preamble/FCH/MAP are kept unchanged
- Only new DL (UL) 16m zones are appended (resource allocation is done by BS cooperation)

BS cooperation

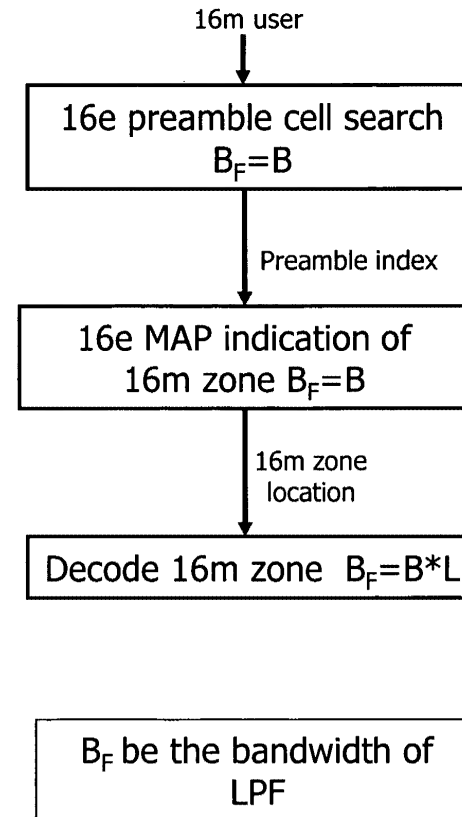
- 16e BS's transmit 16e data using subcarriers with BW B of their own, while share subcarriers with BW $B*L$ in 16m zone.



Proposed structure A

Cell search by 16m user

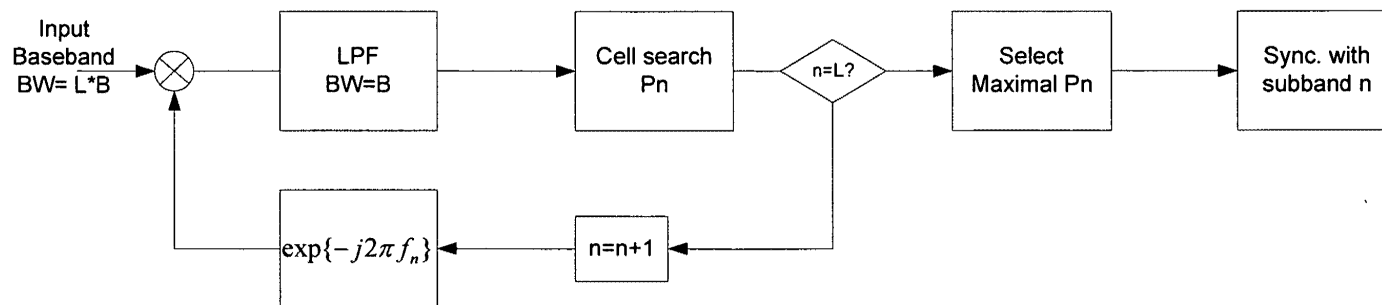
- Baseband BW of $L*B$
- Detect 16e preamble with BW of B
- Decode FCH/MAP to decide the location of 16m zone
- Retrieve 16m zone with BS with BW of $L*B$



Proposed structure A

16e preamble cell search by 16m user

- RF synthesizer sweeps bands with band size of $L \cdot B$
- For each band, decide target preamble in each of 16e subband
 - ▶ Partition the band into several 16e subbands
 - ▶ Transform each of the subband signal to baseband using freq. offset manipulation
 - ▶ Filter the low-pass signal with BW B
 - ▶ Detect the preamble signal in BW B
 - ▶ Select the preamble with maximal detected power as desired preamble



Frame structure B

Frequency planning

- Use the same band class as 16e

Backward compatibility

- 16e preamble/FCH/MAP are kept unchanged
- Adjust the duty cycle so that 16e subframes are shorten in a frame with the other unused portion left for 16m service
- 16m data can be informed by 16e MAP. In case 16e signal can not provide information of 16m service, 16m preamble is optionally given to 16m user for cell search

BS cooperation

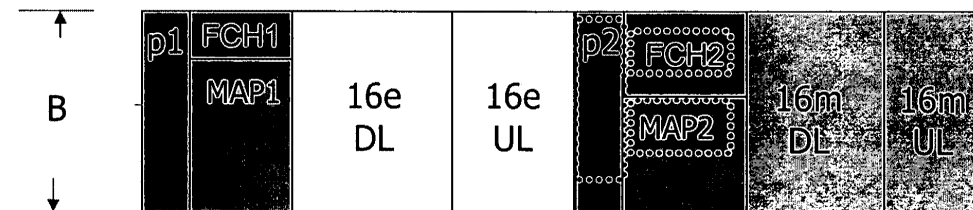
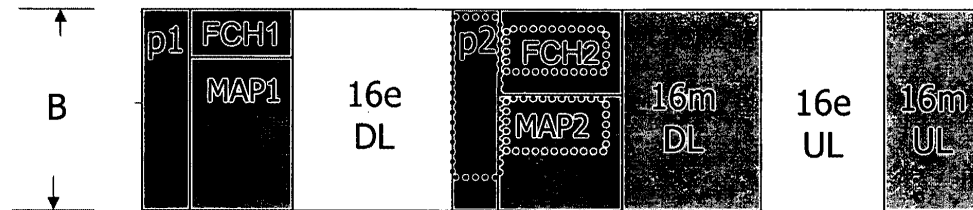
- 16e/16m BS's share the same BW with TDMA-like approach
- 16e zone can vanish if 16m preamble is given

16m service detection

- Detection of 16e preamble/FCH/MAP, or
- Detection of 16m preamble/FCH/MAP

Frame structure B

Example of a multi-standard frame



option

p1: 16e preamble

p2: 16m preamble



Industrial Technology
Research Institute
SoC Technology Center

WMLAX

7/9

Summary

Structure A

- An OFDMA system with multiple zones
- A specific resource (BW) sharing scheme
 - ▶ Multiple BS share channel with BW $B \cdot L$
 - ▶ Independent allocation zone vs. cooperative allocation zone
- A specific cell search scheme
 - ▶ Partition the band into several 16e subbands
 - ▶ Transform each of the subband signal to baseband using freq. offset manipulation
 - ▶ Filter the low-pass signal with BW B
 - ▶ Detect the preamble signal in BW B

Summary

Structure B

- An OFDMA system with multiple DL (UL) subframes from multiple standards
- Multiple DL (UL) subframes are transmitted by different BS's
- Adjust duty cycles for legacy and new systems in non-overlapping time subframe to optimize the bandwidth utilization and performance
- When only 16m and 16e are present in the frame, at least one of 16e preamble and 16m midamble is given in each frame