Modification of Long/short preamble of OFDM mode

IEEE 802.16 Presentation Submission Template (Rev. 8.21)

Document Number:

[S802.16a-02/93]

Date Submitted:

[2002-11-14]

Source:

[Panyuh Joo]
[Samsung Electronics]
[Maetan-3, Paldal,]
[Suwon, Gyeonggi, Korea 442-742]

Voice: [82-31-279-5096]
Fax: [82-31-279-5130]
E-mail: [panyuh@samsung.com]

Venue:

[#22 Kauai, Hawaii, TGa session]

Base Document:

[IEEE C802.16a-02/93]

Purpose:

[Only changing preamble of 802.16a/D6]

Preambles of 256 OFDM mode

Panyuh Joo
Samsung Electronics

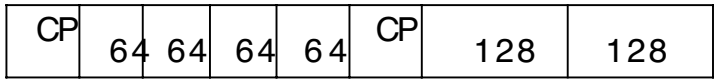
Design criterions of preamble for OFDM system

- Low PAPR
- Suitable for parameter estimation
  - Timing : need Good correlation properties
  - Frequency offset estimation(wide range ,fast , accurate)
  - Channel estimation
- Low computational complexity and low overhead.

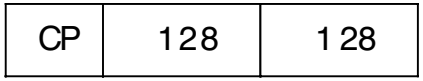
Current IEEE 802.16aD6 preamble and training sequence

- 256 OFDM mode

➢ long preamble: consists of a CP followed by 4 times 64 samples followed by a CP and 2 times 128 samples



➢ short preamble :same as the second part of long preamble



Long and short Preambles

The first part of long preamble:

S(-100:100)={+1+j,0,0,0,+1+j,0,0,0,+1+j ,0,0,0,+1-j,0,0,0,-1+j ,0,0,0,+1+j,0,0,0,
+1+j,0,0,0,+1+j,0,0,0,+1-j,0,0,0,-1+j ,0,0,0,+1+j,0,0,0,+1+j ,0,0,0,
+1+j,0,0,0,+1-j ,0,0,0,-1+j,0,0,0,+1-j ,0,0,0,+1-j,0,0,0,+1-j ,0,0,0,
-1-j,0,0,0,+1+j ,0,0,0,-1+j,0,0,0,-1+j ,0,0,0,-1+j,0,0,0,+1+j ,0,0,0,
-1-j,0,0,0,0,0,0,0,-1-j ,0,0,0,+1-j,0,0,0,+1+j ,0,0,0,-1-j,0,0,0,-1+j ,
0,0,0,+1-j,0,0,0,+1+j ,0,0,0,-1+j,0,0,0,+1-j ,0,0,0,-1-j,0,0,0,+1+j ,
0,0,0,-1+j,0,0,0,-1-j ,0,0,0,+1+j,0,0,0,+1-j ,0,0,0,-1-j,0,0,0,+1-j ,
0 ,0 ,0 ,+1+j,0,0,0,-1-j,0 ,0 ,0 ,-1+j,0,0,0,-1+j,0 ,0 ,0 ,-1-j,0,0,0,+1-j,
0 , 0 , 0 , -1+j , 0 , 0 , 0 , +1+j}*sqrt(2)*sqrt(2)

The short preamble or second part of long preamble

P(-100:100)={-1 ,0,1 ,0 ,1 ,0 ,1 ,0 ,1 ,0 ,-1,0,-1 ,0 ,1 ,0 ,-1,0,1,0,-1 ,0 ,-1,0,1,0,1,0,-1 ,0 ,
1 ,0 ,-1,0,1,0,-1 ,0 ,1 ,0 ,-1,0,1,0,1,0,-1 ,0 ,1 ,0 ,-1,0,-1 ,0 ,1 ,0,-1,0,-1 ,0 ,
-1,0,1,0,1,0,-1 ,0 ,1 ,0 ,1 ,0 ,1 ,0 ,-1,0,1,0,1,0,-1,0 ,-1,0,-1 ,0,1 ,0 ,1 ,0 ,
1 ,0 ,1 ,0 ,1 ,0 ,1 ,0 ,1 ,0 ,0,0 ,-1,0,-1 ,0,1 ,0 ,-1,0,-1,0 ,1 ,0 ,1 ,0,1 ,0 ,-1,0,
1 ,0 ,1 ,0 ,1 ,0 ,-1,0,-1 ,0 ,-1,0,-1 ,0 ,-1,0,-1 ,0 ,1 ,0 ,-1,0,-1 ,0 ,-1,0,-1 ,0 ,-1,0,
-1,0,1,0,1,0,1,0,-1 ,0 ,1 ,0 ,-1,0,1,0,1,0,-1 ,0 ,1,0 ,1 ,0 ,1 ,0,-1,0,-1 ,0 ,
-1,0,-1,0,-1,0,1,0,-1,0,-1,0,1,0,-1,0,-1,0,1,0,-1}*sqrt(2)*sqrt(2)

The PAPR of Preamble P is 3.5805

New preamble

```
PAPR = 2.671489 dB
P[-100:100] = {
          1   0  -1   0  -1   0  -1   0   1   0   1   0        [-100:-89]
          1   0   1   0  -1   0   1   0  -1   0  -1   0  -1    [-88:-76]
          0   1   0  -1   0   1   0   1   0   1   0   1        [-75:-64]
          0  -1   0   1   0   1   0   1   0  -1   0   1   0    [-63:-51]
         -1   0   1   0   1   0  -1   0  -1   0   1   0        [-50:-39]
         -1   0   1   0  -1   0   1   0   1   0  -1   0   1    [-38:-26]
          0   1   0  -1   0  -1   0  -1   0   1   0  -1        [-25:-14]
          0  -1   0  -1   0  -1   0  -1   0   1   0   1   0    [-13:-1]
          0
          0   1   0  -1   0  -1   0   1   0  -1   0   1   0    [1:13]
          1   0   1   0   1   0  -1   0   1   0   1   0        [14:25]
          1   0   1   0  -1   0   1   0  -1   0  -1   0  -1    [26:38]
          0  -1   0   1   0   1   0  -1   0   1   0  -1        [39:50]
          0  -1   0  -1   0  -1   0  -1   0  -1   0  -1   0    [51:63]
         -1   0   1   0   1   0   1   0  -1   0  -1   0        [64:75]
         -1   0   1   0   1   0  -1   0  -1   0  -1   0   1    [76:88]
          0  -1   0  -1   0   1   0  -1   0  -1   0  -1        [89:100]
} * sqrt(2) * sqrt(2)
```

- **The PAPR is 2.671489dB**

Conclusion :

- If it is feasible to fix preamble of 256 FFT OFDM mode
- Without any MAC overhead
- No much big impact on the schedule of standard
- About 1 dB Lower PAPR