101.4.4.8 Burst Markers

101.4.4.8.1 Introduction

Burst markers are used to indicate the start or end of a burst received via the PMA service interface. A burst marker is a predefined sequence of two types burst marker elements: B's and 0's, where B's represent differential QPSK (D-QPSK) modulated symbols (see 101.4.4.8.3 and 101.4.4.8.4), and 0's represent nulls (i.e., no energy being transmitted). Each burst marker element is transmitted in one resource element. B burst marker elements are boosted by 3dB. The first modulated B marker element on a subcarrier is encoded as a reference pilot. There are separate burst marker patterns for 8 and 16 symbol Resource Blocks.

Burst markers are placed by the upstream Symbol Mapper function (see 101.x.x.x).

101.4.4.8.2 Burst marker start and stop sequences

For the 8 symbol Resource Block, the start and stop burst marker sequences are defined in Figure 101-1. For the 16 symbol Resource Block, the start and stop marker sequences are defined in Figure 101-2.

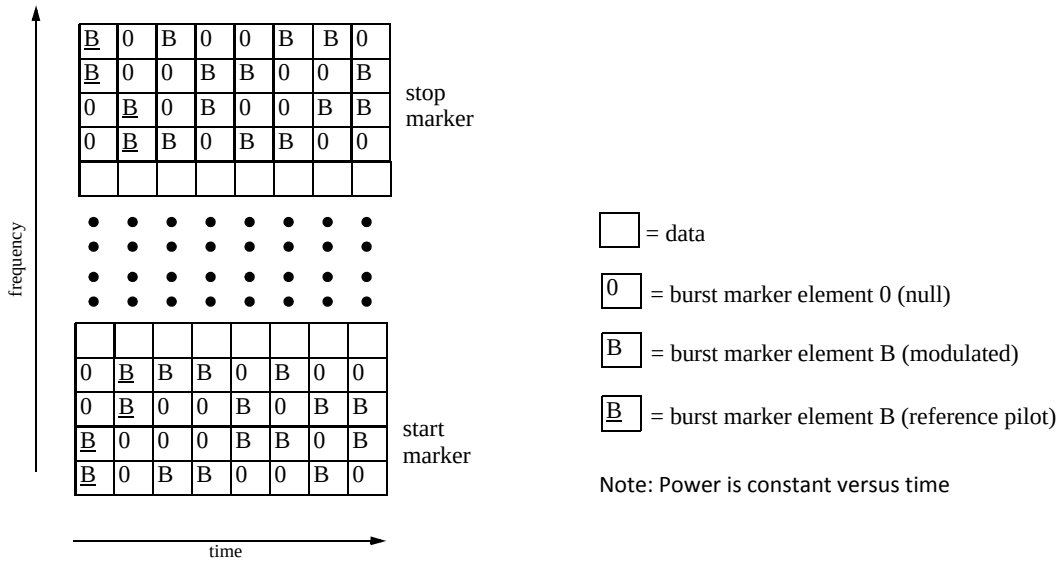

Figure 101–1—Burst marker in 8 symbol resource block

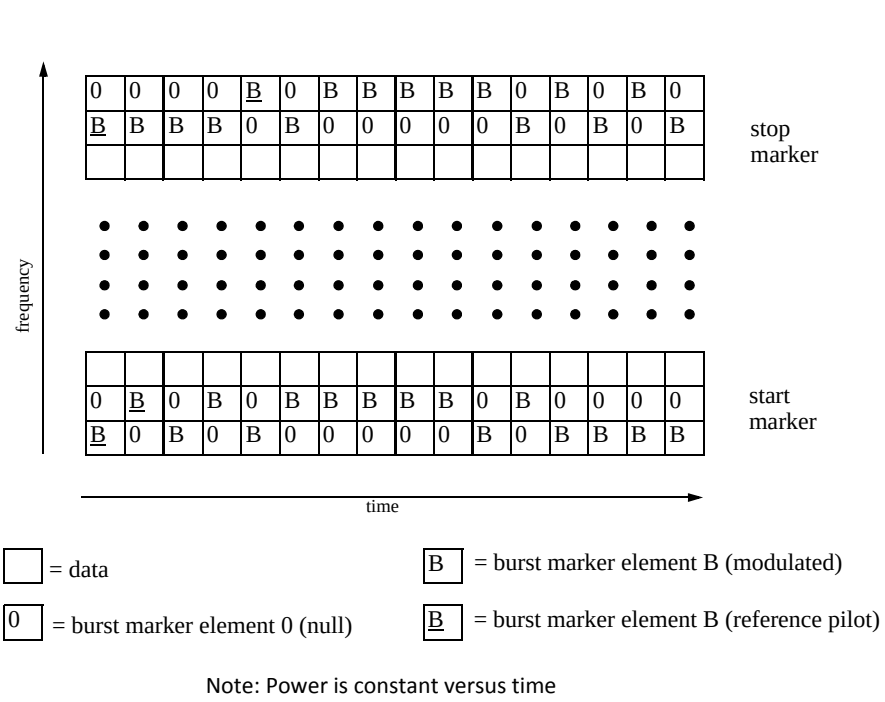

Figure 101–2—Burst Marker example in 16 symbol resource block

101.4.4.8.3 Burst marker B element encoding

The first modulated D-QPSK symbol for each subcarrier of a start and end burst marker is a reference pilot and is modulated with value (11). This is indicated by the position of the B burst marker element in Figure 101-X1, Figure 101-X2, Figure 101-X3, and Figure 101-X4.

The remaining B burst marker elements are D-QPSK modulated with Information value pairs and Parity encoding value pairs. The parity encoding is a Reed-Solomon coding over GF(2^4) with t = 2. The Reed-Solomon code of RS(15,11) is shortened to length 6 of 7 depending on the resource block length. The RS generator is shown in equation 101-E1 where the primitive element alpha (a) is 0x2.

$$g(x) = (x + a^0)(x + a^1)(x + a^2)(x + a^3) \quad (101–1)$$

The RS primitive polynomial is shown in equation 101-E2.

$$p(x) = x^4 + x + 1 \quad (101–2)$$

For RB size of 8, two information code symbols designated I2 and I1 contain 8 information bits and are encoded and shortened to a length of 6:

(0 0 0 0 0 0 0 0 I2 I1 P4 P3 P2 P1)

For RB size of 16, three information code symbols designated I3, I2, and I1 contain 12 information bits and are encoded and shortened to a length of 7:

(0 0 0 0 0 0 0 0 I3 I2 I1 P4 P3 P2 P1)

Each information code symbol is represented by a pair of D-QPSK symbols. The high order pair is designated as $I_{\#N}$ and the low order pair by $I_{\#L}$, for # = 1, 2, or 3. For each parity code symbol high order pair is designated as $P_{\#N}$ and the low order pair by $P_{\#L}$, for # = 1, 2, 3, or 4.

For start burst markers and RB size 8, the two information code symbols I_2 and I_1 are each set to 0xF (i.e. 0xFF, all one's in all information symbols) with the D-QPSK modulated symbol pair placement as per Figure 101-X3.

For start burst markers and RB size 16, the three information code symbols I_3, I_2, and $I_1$are each set to 0xF (i.e., 0xFFF, all ones in all information symbols) with the D-QPSK modulated symbol pair placement as per Figure 101-X4.

For end burst markers and RB size 8, the two information code symbols are set as follows: L_2 encodes the last resource block value as designated by the symbol mapper (see 101.x.x.x) as per Table 101-X1 and L_1 encodes the last fill bit position value as designated by the symbol mapper (see 101.x.x.x) as per Table 101-X2 with the D-QPSK modulated symbol pair placement as per Figure 101-X3.

For end burst markers and RB size 16, the three information code symbols are set as follows: L_3 encodes a pad value of 0x00 (i.e., not null), L_2 encodes the last resource block value as designated by the symbol mapper (see 101.x.x.x) as per Table 101-X1 and L_1 encodes the last fill bit position value as designated by the symbol mapper (see 101.x.x.x) as per Table 101-X2 with the D-QPSK modulated symbol pair placement as per Figure 101-X4.

Table 101–1—Last resource element position encoding

Last RE Position in Last RB	MSB Pointer Bits $(I_{2H})I(_{2L})$ $(0_{MSB}\ 0)_H\ (0_{MSB}\ 0)_L$
0	$(00)_H(00)_L$
1	$(00)_H(01)_L$
2	$(00)_H(10)_L$
3	$(01)_H(11)_L$
4	$(01)_H(00)_L$
5	$(01)_H(01)_L$
6	$(01)_H(10)_L$
7	$(01)_H(11)_L$
8	$(10)_H(00)_L$
9	$(10)_H(01)_L$
10	$(10)_H(10)_L$
11	$(10)_H(11)_L$
12	$(11)_H(00)_L$
13	$(11)_H(01)_L$

Table 101–1—Last resource element position encoding

Last RE Position in Last RB	MSB Pointer Bits $(I_{2H})I(_{2L})$ $(0_{MSB}\ 0)_H\ (0_{MSB}\ 0)_L$
14	$(11)_H(10)_L$
15	$(11)_H(11)_L$

.

Table 101–2—Last bit position encoding

Last Fill Bit Position in Last RE	MSB Pointer Bits $(I_{1H})I(_{1L})$ $(0_{MSB}\ 0)_H\ (0_{MSB}\ 0)_L$
0	$(00)_H(00)_L$
1	$(00)_H(01)_L$
2	$(00)_H(10)_L$
3	$(01)_H(11)_L$
4	$(01)_H(00)_L$
5	$(01)_H(01)_L$
6	$(01)_H(10)_L$
7	$(01)_H(11)_L$
8	$(10)_H(00)_L$
9	$(10)_H(01)_L$
10	$(10)_H(10)_L$
11	$(10)_H(11)_L$
12	$(11)_H(00)_L$
13	$(11)_H(01)_L$
14	$(11)_H(10)_L$
15	$(11)_H(11)_L$

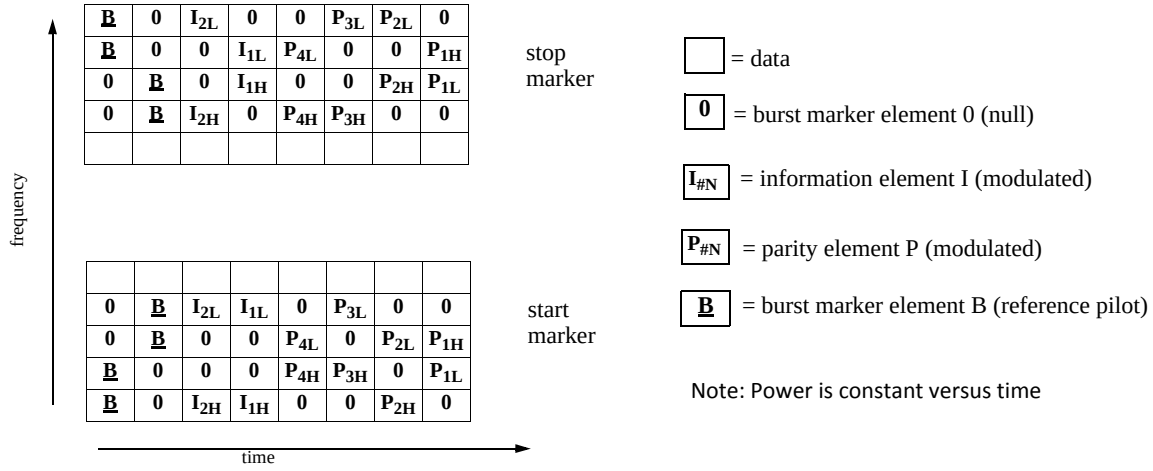

Figure 101–3—Stop burst marker encoding in 8 symbol resource block

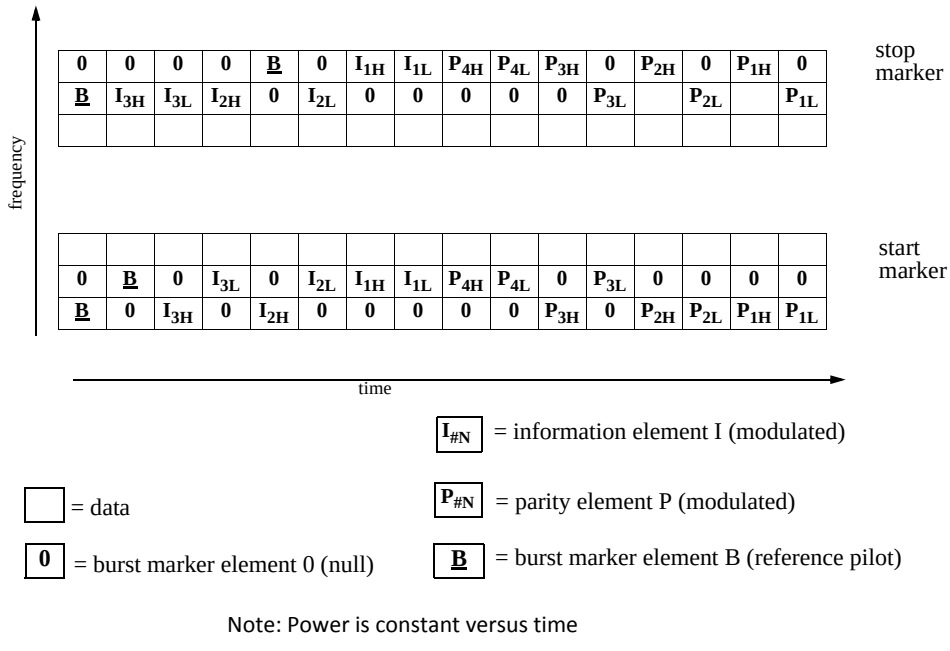

Figure 101–4—Stop burst marker encoding in 16 symbol resource block