TSG-RAN Working Group 1 meeting #9 **TSGR1#9(99) J40**

Dresden (Germany), November 30th- December 3rd 99

Agenda Item :

Source : Samsung Electronics co.

Title : SSDT ID code

Document for : Discussion and Approve

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1. Introduction

The Site selection Diversity Transmit power control (SSDT) is an optional macro diversity in the soft handover mode. The UE sends the “primary” cell ID code and the active cells detect the “primary” cell ID information. In the text, the set of the “primary” cell ID code is not a linear block code. When we use the non-linear block, the code set design is very sensitive for the performance. Normally, if we select the non-linear block code, it is difficult for decoding code. And we may not know that the one non-linear block code set is optimal. Then, we consider a linear block code set for the “primary” cell ID. The subset of this code set is also a linear block code set. And we design the code set to be optimal in fading characteristic. The simulation results show that the performance of the proposed code set is better than that of the current one. And the linear block code set is easier to decode when compared to the case of the non-linear block code.

2. Advantages

There are two main advantages in the proposed linear block code set.

1. Performance: In Fig. 1 and 2, we can see that performance of the proposed code set is better than that of the current non-linear block code set for the “primary” cell ID.
2. Complexity: It is easier to implement a decoder in the case of the proposed linear block code set compared to the current non-linear block code set.

Actually, considering the number of elements in active set, it is desirable for maximizing the downlink capacity and natural for maintaining the better status of the network that we have to reduce that number as small as possible.

In addition, for constructing a linear block code in SSDT mode, we have the following criterion.

1. When the number of active set is 2 (1bit), the code should be optimal code.
2. When the number of active set is 4 (2bit), the code should be optimal code including the above codes.

3. When the number of active set is 8 (3bit), the code should be optimal code including the above codes.

For criterion 1, the repetition code is optimal code. And, for criterion 2 and 3, the sub-code of Bi-orthogonal code is disirable.

In the following figures, we describe the performance of the proposed SSDT ID Code.

Figure 1. The Identification error rate versus Eb / No: 1 bit FBI, long ID code, mobile velocity is 120 km/h, 1 path, no power control.

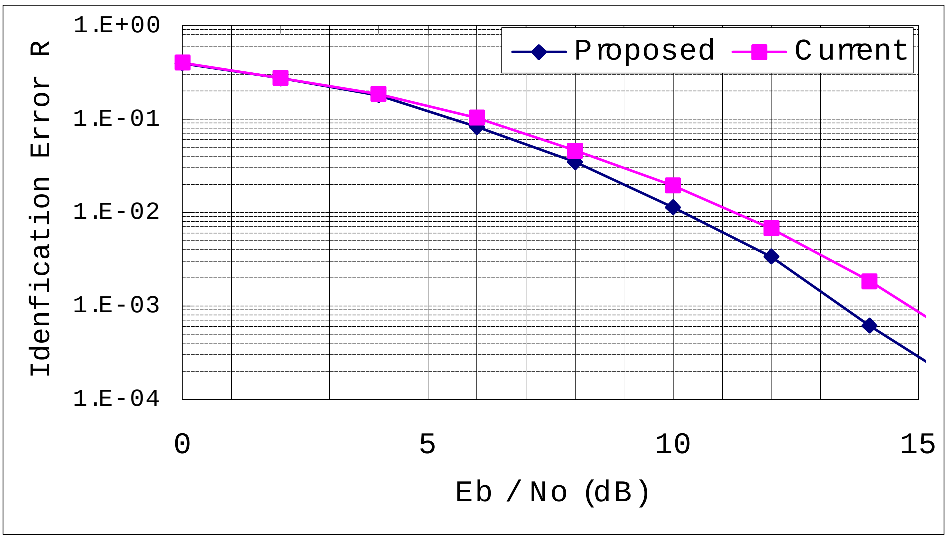

Figure 2. The Identification error rate versus Eb / No: 2 bit FBI, long ID code, mobile velocity is 120 km/h, 1 path, no power control.

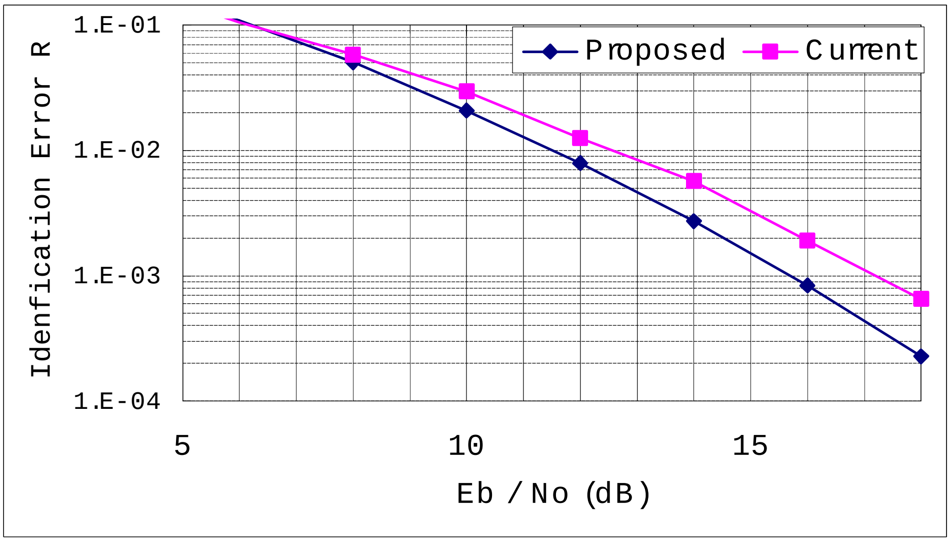

Table 1. Settings of ID codes for 1 bit FBI

ID Label	ID code		
	“long”	“medium”	“short”
0	000000000000000	0000000(0)	00000
1	111111111111111	1111111(1)	11111
2	010101010101010	0101010(1)	01010
3	101010101010101	1010101(0)	10101
4	001100110011001	0011001(1)	00110
5	110011001100110	1100110(0)	11001
6	011001100110011	0110011(0)	01100
7	100110011001100	1001100(1)	10011

Table 2. Settings of ID codes for 2 bit FBI

ID Label	ID code		
	“long”	“medium”	“short”
0	0000000(0) 0000000(0)	000(0) 000(0)	000 000
1	1111111(1) 1111111(1)	111(1) 111(1)	111 111

2	0000000(0) 1111111(1)	000(0) 111(1)	000 111
3	1111111(1) 0000000(0)	111(1) 000(0)	111 000
4	0101010(1) 0101010(1)	010(1) 010(1)	010 010
5	1010101(0) 1010101(0)	101(0) 101(0)	101 101
6	0101010(1) 1010101(0)	010(1) 101(0)	010 101
7	1010101(0) 0101010(1)	101(0) 010(1)	101 010

3. Conclusion

We can obtain the performance gain by using the proposed code in SSDT ID code set against the current one. Approximately 1.5 dB gain is achieved when identification error is 0.1%. Furthermore, the proposed code set decoder can be constructed easier than that of the current one by FHT with stage 2.

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