

**Agenda Item :**

**Source : LG Information & Communications, Ltd.**

**Title : Text Proposal of Pilot Patterns for Downlink Channels**

**Document for : Decision**

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**1. Introduction**

This document proposes new pilot patterns for downlink channels considering diversity [1]. The shadowed pilot symbol patterns of downlink DPCH and SCCPCH for the diversity antenna are STTD encoded, whereas the non-shadowed pilot symbol patterns of the channels are designed to be orthogonal to the ordinary pilot symbol pattern. However the diversity pilot pattern for downlink DPCH with  $N_{\text{pilot}} = 4$  are STTD encoded since STTD encoding requires two symbols. According to current S1.11 [2], the ordinary pilot symbols of PCCPCH and SCCPCH are the same, and the diversity antenna pilot pattern of PCCPCH is encoded to be orthogonal to the ordinary pilot pattern since STTD is not applied to the pilot pattern of PCCPCH. Therefore we also propose PCCPCH pilot pattern using the same method.

**2. Required Modifications**

<Text Changes for S1.11>

**5.3.2 Dedicated downlink physical channels**

Table 10: Pilot Symbol Pattern

	$N_{\text{pilot}} = 4$		$N_{\text{pilot}} = 8$			$N_{\text{pilot}} = 16$								
Symbol #	0	1	0	1	2	3	0	1	2	3	4	5	6	7

Slot #1	11	11	11	11	11	10	11	11	11	10	11	11	11	01
2	11	10	11	10	11	11	11	10	11	11	11	01	11	11
3	11	00	11	00	11	01	11	00	11	01	11	11	11	01
4	11	10	11	10	11	11	11	10	11	11	11	10	11	00
5	11	11	11	11	11	10	11	11	11	10	11	00	11	01
6	11	10	11	10	11	11	11	10	11	11	11	01	11	00
7	11	11	11	11	11	01	11	11	11	01	11	00	11	10
8	11	10	11	10	11	00	11	10	11	00	11	01	11	11
9	11	00	11	00	11	01	11	00	11	01	11	00	11	10
10	11	01	11	01	11	00	11	01	11	00	11	10	11	00
11	11	11	11	11	11	10	11	11	11	10	11	00	11	10
12	11	01	11	01	11	00	11	01	11	00	11	01	11	11
13	11	00	11	00	11	01	11	00	11	01	11	11	11	10
14	11	01	11	01	11	00	11	01	11	00	11	10	11	11
15	11	00	11	00	11	10	11	00	11	10	11	11	11	01
16	11	01	11	01	11	11	11	01	11	11	11	10	11	00

### 5.3.2.1 STTD for DPCH

Table 12: Pilot pattern of the DPCH channel for the diversity antenna using STTD

	$N_{\text{pilot}} = 4$		$N_{\text{pilot}} = 8$				$N_{\text{pilot}} = 16$							
Symbol #	0	1	0	1	2	3	0	1	2	3	4	5	6	7

Slot #1	01	10	11	00	00	10	11	00	00	10	11	11	00	10
2	00	10	11	01	00	11	11	01	00	11	11	01	00	00
3	10	10	11	11	00	01	11	11	00	01	11	11	00	10
4	00	10	11	01	00	11	11	01	00	11	11	10	00	11
5	01	10	11	00	00	10	11	00	00	10	11	11	00	01
6	00	10	11	01	00	11	11	01	00	11	11	10	00	00
7	01	10	11	11	00	10	11	11	00	10	11	00	00	01
8	00	10	11	10	00	11	11	10	00	11	11	01	00	00
9	10	10	11	11	00	01	11	11	00	01	11	00	00	01
10	11	10	11	10	00	00	11	10	00	00	11	10	00	11
11	01	10	11	00	00	10	11	00	00	10	11	00	00	01
12	11	10	11	10	00	00	11	10	00	00	11	01	00	00
13	10	10	11	11	00	01	11	11	00	01	11	00	00	10
14	11	10	11	10	00	00	11	10	00	00	11	01	00	11
15	10	10	11	00	00	01	11	00	00	01	11	11	00	10
16	11	10	11	01	00	00	11	01	00	00	11	10	00	11

### 5.3.3.1 Primary Common Control Physical Channel (CCPCH)

Table 13: Pilot Symbol Pattern

Symbol #	0	1	2	3
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Slot #1	11	11	11	10
2	11	10	11	11
3	11	00	11	01
4	11	10	11	11
5	11	11	11	10
6	11	10	11	11
7	11	11	11	01
8	11	10	11	00
9	11	00	11	01
10	11	01	11	00
11	11	11	11	10
12	11	01	11	00
13	11	00	11	01
14	11	01	11	00
15	11	00	11	10
16	11	01	11	11

**5.3.3.1.1 Primary CCPCH structure with STTD encoding**

Table 14: Diversity antenna pilot pattern for PCCPCH

Symbol #	0	1	2	3
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Slot #1	11	11	00	01
2	11	10	00	00
3	11	00	00	10
4	11	10	00	00
5	11	11	00	01
6	11	10	00	00
7	11	11	00	10
8	11	10	00	11
9	11	00	00	10
10	11	01	00	11
11	11	11	00	01
12	11	01	00	11
13	11	00	00	10
14	11	01	00	11
15	11	00	00	01
16	11	01	00	00

### 5.3.3.2 Secondary Common Control Physical Channel

Table 16: Pilot Symbol Pattern

	$N_{\text{pilot}} = 8$				$N_{\text{pilot}} = 16$							
Symbol #	0	1	2	3	0	1	2	3	4	5	6	7

Slot #1	11	11	11	10	11	11	11	10	11	11	11	01
2	11	10	11	11	11	10	11	11	11	01	11	11
3	11	00	11	01	11	00	11	01	11	11	11	01
4	11	10	11	11	11	10	11	11	11	10	11	00
5	11	11	11	10	11	11	11	10	11	00	11	01
6	11	10	11	11	11	10	11	11	11	01	11	00
7	11	11	11	01	11	11	11	01	11	00	11	10
8	11	10	11	00	11	10	11	00	11	01	11	11
9	11	00	11	01	11	00	11	01	11	00	11	10
10	11	01	11	00	11	01	11	00	11	10	11	00
11	11	11	11	10	11	11	11	10	11	00	11	10
12	11	01	11	00	11	01	11	00	11	01	11	11
13	11	00	11	01	11	00	11	01	11	11	11	10
14	11	01	11	00	11	01	11	00	11	10	11	11
15	11	00	11	10	11	00	11	10	11	11	11	01
16	11	01	11	11	11	01	11	11	11	10	11	00

### 5.3.3.2.1 Secondary CCPCH structure with STTD encoding

Table 17: Pilot symbol pattern for the diversity antenna when STTD encoding is used on the SCCPCH

	$N_{\text{pilot}} = 8$				$N_{\text{pilot}} = 16$							
Symbol #	0	1	2	3	0	1	2	3	4	5	6	7

Slot #1	11	00	00	10	11	00	00	10	11	11	00	10
2	11	01	00	11	11	01	00	11	11	01	00	00
3	11	11	00	01	11	11	00	01	11	11	00	10
4	11	01	00	11	11	01	00	11	11	10	00	11
5	11	00	00	10	11	00	00	10	11	11	00	01
6	11	01	00	11	11	01	00	11	11	10	00	00
7	11	11	00	10	11	11	00	10	11	00	00	01
8	11	10	00	11	11	10	00	11	11	01	00	00
9	11	11	00	01	11	11	00	01	11	00	00	01
10	11	10	00	00	11	10	00	00	11	10	00	11
11	11	00	00	10	11	00	00	10	11	00	00	01
12	11	10	00	00	11	10	00	00	11	01	00	00
13	11	11	00	01	11	11	00	01	11	00	00	10
14	11	10	00	00	11	10	00	00	11	01	00	11
15	11	00	00	01	11	00	00	01	11	11	00	10
16	11	01	00	00	11	01	00	00	11	10	00	11

## References

- [1] LGIC, “Pilot Patterns for Downlink DPCH, PCCPCH, and SCCPCH”, TSGR1#5(99)551.
- [2] “UTRA FDD ; Physical layer procedures”, 3GPP RAN S1.11 v2.0.0 (1999-04), TSGR1#4(99)527.