4x4 MIMO Channel Estimation

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1 4x4 MIMO 信道估计

802.11n 中 4x4 Preamble 正交序列

	t1	t2	t3	t4
P1	1	-1	1	1
P2	1	1	-1	1
P3	1	1	1	-1
P4	-1	1	1	1

Table 1: 802.11n HTLTF 正交化序列

接收端第一根天线在各时刻接收到的信号为（X 为 HTLTF 序列）

$$y_{1,t1} = h_{11}X + h_{12}X + h_{13}X - h_{14}X \quad (1)$$
$$y_{1,t2} = -h_{11}X + h_{12}X + h_{13}X + h_{14}X \quad (2)$$
$$y_{1,t3} = h_{11}X - h_{12}X + h_{13}X + h_{14}X \quad (3)$$
$$y_{1,t4} = h_{11}X + h_{12}X - h_{13}X + h_{14}X \quad (4)$$

解方程

$$y_1 = y_{1,t1} + y_{1,t4} = 2h_{11}X + 2h_{12}X \quad (5)$$
$$y_2 = y_{1,t2} - y_{1,t3} = -2h_{11}X + 2h_{12}X \quad (6)$$
$$y_3 = y_{1,t1} - y_{1,t4} = 2h_{13}X - 2h_{14}X \quad (7)$$
$$y_4 = y_{1,t2} + y_{1,t3} = 2h_{13}X + 2h_{14}X \quad (8)$$
$$h_{11} = (y_1 - y_2)/4X \quad (9)$$
$$h_{12} = (y_1 + y_2)/4X \quad (10)$$
$$h_{13} = (y_3 + y_4)/4X \quad (11)$$
$$h_{14} = (y_4 - y_3)/4X \quad (12)$$

其余信道可由上述方法解出。各天线 i 可并行计算各自的信道 $h_{i,j}, j \in \{1,2,3,4\}$