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Purpose:

[Changing the method to transmit STC preamble and inserting STC preamble in OFDM system with 2 transmit antennas]

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STC (Space-Time Code)

Preamble Sequence in OFDM system

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256-OFDM Mode with 2 Tx. Antennas

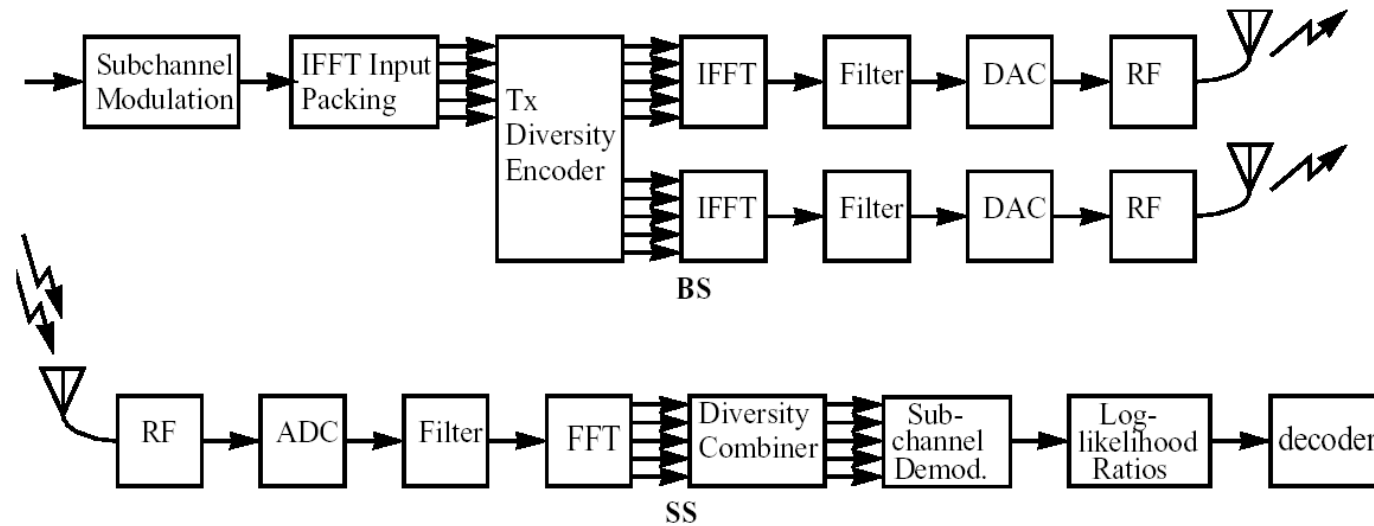
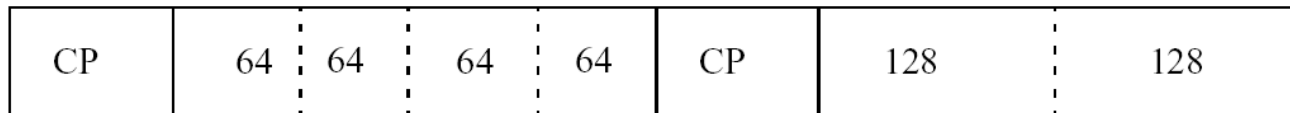
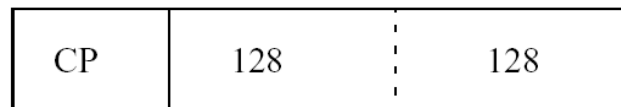


Figure 128bf—Illustration of STC

Long Preamble { $S(-100:100) + P_{\text{even}}(-100:100)$ }



Short Preamble { $P_{\text{even}}(-100:100)$ }



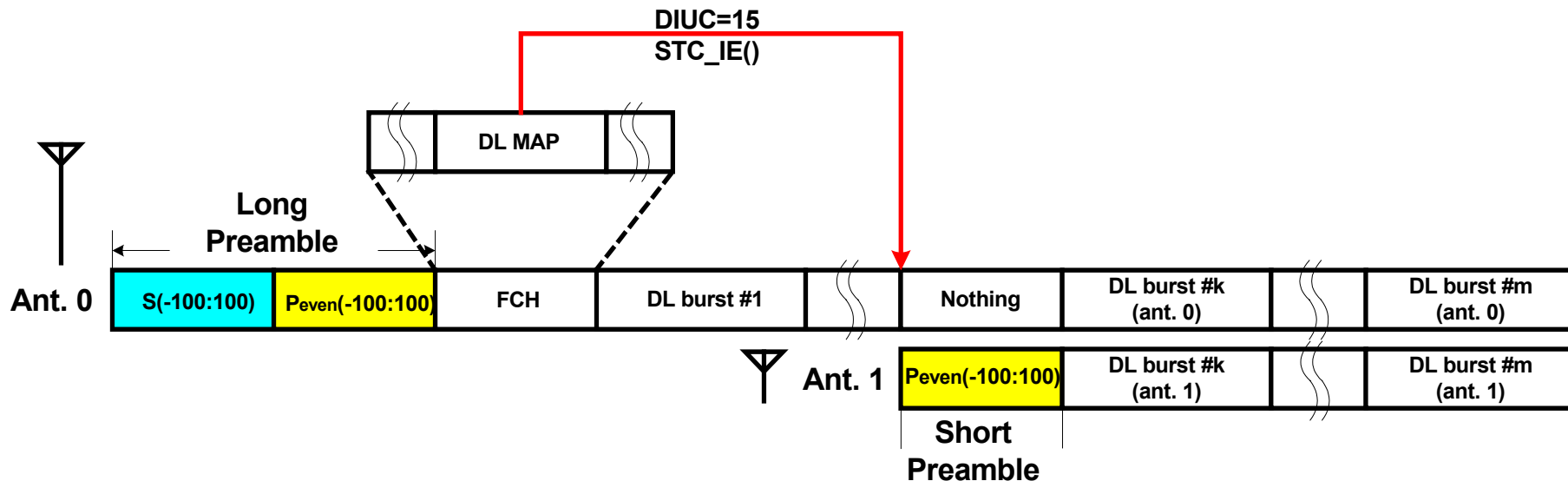
Procedure for Initialization (1-Tx)

Long Preamble

- **First Part**
 - ◆ **S (-100:100)**
 - ◆ **Coarse synchronization**
 - ◆ **One time transmission**
- **Second Part (Short Preamble)**
 - ◆ **P_{even} (-100:100)**
 - ◆ **Fine synchronization & channel estimation**
 - ◆ **One time transmission**
- **Note**
 - ◆ **Odd carrier channel estimation**
 - ➔ **Interpolation using channel model**

STC Preamble Transmission Method

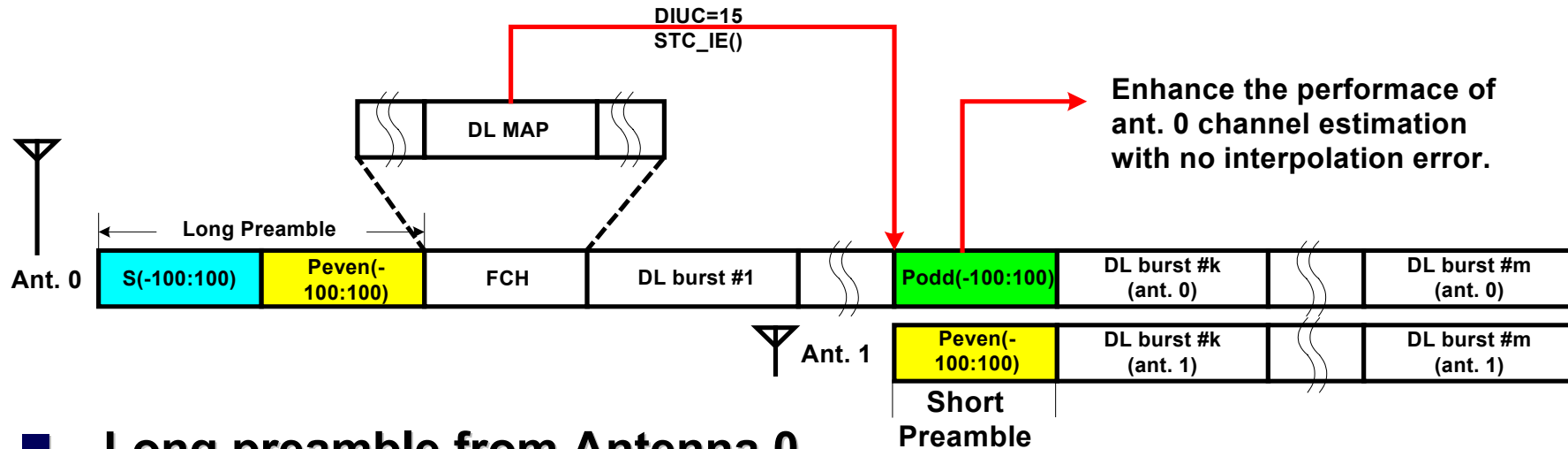
Current Version



- Long preamble from Antenna 0
 - ◆ Synchronization
 - ◆ Channel Estimation
- Short preamble from Antenna 1
 - ◆ Transmission during $\text{DIUC}=15 \text{ STC_IE}()$
 - ◆ $P_{\text{even}}(-100:100)$

STC Preamble Transmission Method

Proposed Version



- Long preamble from Antenna 0
 - ◆ Synchronization
 - ◆ Channel Estimation
- Short preamble from **Both** Antenna 0 and Antenna 1
 - ◆ Transmission during DIUC=15 STC_IE()
 - ◆ $P_{odd}(-100:100)$ from Antenna 0
 - ◆ $P_{even}(-100:100)$ from Antenna 1

STC Short Preamble Sequence Using Odd Carriers

$$P_{\text{odd}}(-100:100) = \{0, -1, 0, -1, 0, +1, 0, -1, 0, +1, 0, -1, 0, +1, 0, +1, 0, -1, 0, -1, \\ 0, +1, 0, +1, 0, -1, 0, +1, 0, -1, 0, +1, 0, -1, 0, -1, 0, +1, 0, +1, \\ 0, +1, 0, +1, 0, -1, 0, +1, 0, -1, 0, +1, 0, -1, 0, -1, 0, +1, 0, +1, \\ 0, -1, 0, -1, 0, +1, 0, -1, 0, +1, 0, -1, 0, +1, 0, +1, 0, -1, 0, -1, \\ 0, -1, 0, -1, 0, +1, 0, +1, 0, +1, 0, +1, 0, +1, 0, -1, 0, +1, 0, +1, \\ 0, -1, \\ 0, -1, \\ 0, -1, 0, +1, 0, -1, 0, +1, 0, +1, 0, -1, 0, -1, 0, -1, \\ 0, -1, 0, +1, 0, +1, 0, +1, 0, +1, 0, +1, 0, +1, 0, -1, 0, +1, 0, +1, 0, -1, \\ 0, -1, 0, +1, 0, +1, 0, +1, 0, +1, 0, +1, 0, +1, 0, -1, 0, +1, 0, +1, 0, +1, \\ 0, +1, 0, -1, 0, -1, 0, -1, 0, -1, 0, -1, 0, -1, 0, +1, 0, -1, 0, -1, 0\} \\ * \text{sqrt}(2) * \text{sqrt}(2)$$

PAPR: 2.7448dB

Conclusion

- **Proposed a method for STC preamble transmission in 256-OFDM mode with 2 Tx. antennas.**
- **Channel estimation enhancement for Antenna 0 without changing DL-MAP frame format**
- **Achieved a 2.7448-dB PAPR in a proposed STC preamble sequence using odd carriers.**