

Postamble sequence design for supporting relay zone synchronization

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Purpose:

This contribution proposes a simple method of deriving postamble sequences using the existing preamble sequences and a PN sequence from PRBS defined in current 16e specification.

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Motivation & Design consideration

- The preamble sequence can not applied in both access zone and relay zone
 - It may cause malfunctioning in the legacy MSs as they may start detecting a dual correlation peak within the duration of a single frame.
- The preamble in relay zone can be generated from simple exclusive OR operation with two existing PN sequence in 16d/e not introducing band-new sequence

Two PN sequences in 16d/e

1. Preamble sequences are PN sequences defined in 8.4.6.1.1

- Table 309, 309a, 309b and 309c for FFT sizes of 2048, 1024, 512, 128.respectively.

2. PN Sequence from PRBS generator defined in 8.4.9.4.1

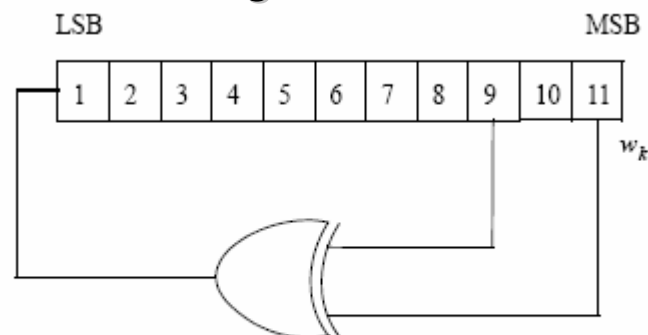


Figure 262—PRBS generator for pilot modulation

- $b_0...b_4$ = Five least significant bits of IDcell
- $b_5...b_6$ = Set to the segment number + 1
- $b_7...b_{10}$ = 0b1111 (all ones) in the downlink

Postamble Sequence Generation

- The new PN sequence is generated by exclusive OR operation with two PN

sequence
$$P_j = W_j \oplus w_j$$

- When W_j is a one of preamble sequences, w_j is PN sequence from PRBS, which has a same sequence length with W_j . Postamble sequence P_j can be generated by exclusive OR bit operation with two sequence

An example of Postamble Sequence

Sequence	Series
W_o	0xC12B7F736CFFB14B6ABF4EB50A60B7A3B4163EA336 0F697C45075997ACE17BB1512C7C0CEBB34B389D87845 53C0FC60BDE4F166CF7B04856442D97539FB915D80820 CEDD858483
w_o	0xF40482D132BF08653E38DB76D5B06E3ADA365DE54E 0EC6BB8AB40C87D313EB88B54C0F8633DF94389B5EC4 BACA3C59A7E70F665FE40E86939BBEA881508251629D 1D2D333FF803
P_o	0x352FFDA25E40B92E548795C3DFD0D9996E206346780 1AFC7CFB355107FF29039E460738AD86CDF0006D940EF F6339FAC3940703313BECEC5DF933FD2CF3B44BA953D E3EEBA7C80

Correlation Performance

- A normalized correlation value are described in the table, when auto-correlation value is “1”

	Preamble(W_0)	Postamble(P_0)
Max cross correlation value with other preamble (W_0, W_1, \dots, W_{113})	0.09 (except W_0)	0.09
Max cross correlation value with other postamble (P_0, P_1, \dots, P_{113})	0.09	0.13 (except P_0)

PAPR Reduction of Postamble

- Some tones may be changed for PAPR reduction. This table shows the one example applying 10% tones (56 tones) are used for PAPR.

Sequence	Sequence series	PAPR
W_o	0xC12B7F736CFFB14B6ABF4EB50A60B7A3B4163EA3360F697 C45075997ACE17BB1512C7C0CEBB34B389D8784553C0FC60B DE4F166CF7B04856442D97539FB915D80820CEDD858483	4.33
P_o	0x352FFDA25E40B92E548795C3DFD0D9996E2063467801AFC7 CFB355107FF29039E460738AD86CDF0006D940EFF6339FAC39 40703313BECEC5DF933FD2CF3B44BA953DE3EEBA7C80	9.34
P'_o	0x252BFDA21E50BD2E548785C7DED099996A2163467801AEC 7CFB351107FB2803DE560339ADC6CDF4016DD41EFB6339BA C3940703312BE8ED5DB923FD2DF3F44BA953DE3EEBA3C80	6.47

Correlation Performance with PAPR reduction

- Auto-correlation performance not knowing the number of location of reserved tones for PAPR may be decrease, but is the number of tones is not too many, the performance is slightly decrease.
- When the number and location of reserved tones is informed to receiver, More correlation performance may be achieve.

	Postamble(P'_0)
Max cross correlation value with other postamble with PAPR reduction ($P'_1, P'_2, \dots, P'_{113}$)	0.11 (except P'_0)
Correlation value with not knowing the location of reserved tones (P_0)	0.91

Proposed text

- [Insert the followings after the end of section

8.4.6.1.1.2:]

8.4.6.1.1.3. Postamble sequence for downlink relay zone

[The text is described in 80216j-07/141r1 in on-site server](#)

- [Add parameter in table 358]

Table 359 – DCD channel encoding

<u>Name</u>	<u>Type</u>	<u>Length</u>	<u>Value</u>	<u>Scope</u>
<u>Reservation bits for PAPR Reduction</u>	<u>XX</u>	<u>3</u>	<u>Bits:#0-7bits: the number of reserved tones</u> <u>Bits:#8-15bits: “A” (in Ak+B)</u> <u>Bits#16-23bits: “B” (in Ak+B)</u>	<u>OFDMA</u>

Appendix

- Postamble sequence with 10% tones are reserved for PAPR

Index	Sequence series	PAPR
0	0x252BFDA21E50BD2E548785C7DED099996A2163467801AEC7CFB351107FB2803DE560339ADC6CDF4016DD41EFB6339BAC3940703312BE8ED5DB923FD2DF3F44BA953DE3EEBA3C80	6.47
1	0x5DF36ECAE21AB50C6302075F446C5117FE896B476D487E70B9B60E4A614ED2A5F455A540453CA491A2F7D3C80A3ADF6E410D29189B105C1DCD8FBE75878CAF5C997358C634AF7E	5.99
2	0xA2569D6AA5BC372A480AACCC2548F9A59F8FEC640DEB8FF4E1B251941EF3B8FCD8EA2A9B504D7B45B7A3CE5A5E6BBC1E6011BCBD02CE3EDF5DC55346FD656D9936B9C422AECE79	5.99
3	0x47937783EC0D3909FFA4047B8CD722EC6CE5DF8F719EF51F82419E32B3728DC7B81051B64B60724B42611BF84B45158D7D50A986E483D90E74855AD77875786A0E194587D9813F	6.55
4	0xEBD04A9A70646218FB07B70C5BD25401CCEEBFE185AB8021179228EC5C3A91D627599B8053545E332A0132F04F897CBBBD0C2172B4A143CA071AE29B87DC94D9BFF6BC2DF846B	6.38
5	0xAA0017AA558DB8F6B7976F8041AC26A1ECB4CE0D7B478E8E18334C91DAD51B6CF37049E1041ABE0733C8806D5CB6AF0B024F5C9B96D57444C17423E25B2D1B452F9F09A9EA9E63	5.68
6	0xBD4869A8075E0590F8D55EEFEDF9807F2AA3AF0CB8698D4618F75FD0A3CE1D44F4916839DE614F461B31FBB258AD99D33F23FBCC0D4DA243AAC7A6A6BA1EBFC99364B0D2DA41C8	5.90
...	...	
110	0904D15A3B86E0377A06537F7E862EC58A90FD5375BD2DD27C11A28C057D1A1DB24035B20DB153B168C3C377C28D10BA3C3318AA9E04B7BF11F368214DD7E92F3DCBBC2D734298	6.29
111	83FCCCA2B27958271BF2B7F5ECD17EE1A45F8A9BD2480C72C5D2EE52E169CEECF1AC6E859BFE7544B780631B1B673D39370AA39E9D0A495AF33ACB361587CF3DA22B258357B3B8	5.98
112	7EE40E7C2C6757BD70C3F1CF2ED985C3782FE452079FBF7948D27F70542AD55664177DA1F5AF22C1F897B4537F1A6B706A1769EB912D25AB53C9581C9C7F613B8329226A72EF49	5.99
113	83583387977FB5CDC06728B96CABA98647DCAC5DFD78EBBD43C781A4FF7B506B04C604164D2805B50E4FD6262F135D105CCCFB81F42064DE83A84285663B6C8A9BC752F919C9F5	5.45