IEEE P802.11
Wireless LANs

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| 30.6.1.5 OFDM Pilot Sequences |
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Abstract

This document proposes specification text for subclause 30.6.1.5 of the spec describing OFDM pilot sequences, [1]

**30.6.1.5 OFDM Pilot sequences**

The pilot sequence *P*(*iSTS*, *n*, *k*) is created by inserting a sequence of zeros corresponding to tones –*NSR* to *NSR*. The pilots are then inserted at the tone indexes *Mp*(*k*) defined in subclause 30.6.1.4 which are frequency channel dependent, but independent on the space-time stream or OFDM symbol number as follows:



The pilot value *PNSP*(*iSTS*, *n*, *k*) depends on the *iSTS*-th space-time stream number, *n*-th OFDM symbol, and *k*-th subcarrier index and defined as follows:

* *PNSP*(*iSTS*, *n*, *k*) = W(*iSTS*, mod(*n*, *NSTS*)) \* (2\**p*(*n*) - 1) \* *PNSP*(*iSTS*, *k*)
* *PNSP*(*iSTS*, *k*) defines pilot for *iSTS*-th space-time stream and *k*-th subcarrier
* W(*iSTS*, *n*) \* (2\**p*(*n*) - 1) defines a common phase shift (over subcarriers) for *iSTS*-th space-time stream and *n*-th OFDM symbol, *p*(*n*) defines a bit coming from the scrambler defined in 20.5.3.2.2 with shift register x1, x2,…, x7 initialized to all ones at the first OFDM symbol
* *NSTS* defines the total number of space-time streams
* mod(*x*, *N*) defines modulo *N* operation

The common phase shift is composed as a product of deterministic shift W(*iSTS*, *n*) repeated with period *NSTS* over the time and random shift defined by (2\**p*(*n*) - 1) which is scrambler output dependent. The random component depends on the *n*-th OFDM symbol number only and does not depend on the particular *iSTS*-th space-time stream number.

The pilot sequence *PNSP*(*iSTS, :*) for given channel bonding factor *NCB* is defined in Table 1.

Table 1: Pilot sequence PNSP(iSTS, :) definition.

|  |  |
| --- | --- |
| ***NCB*** | ***PNSP*(*iSTS, :*)** |
| 1 | *P16*(*iSTS, :*) |
| 2 | *P36*(*iSTS, :*) = [*P12*(*iSTS, :*), *P12*(*iSTS, :*), *P12*(*iSTS, :*)] |
| 3 | *P56*(*iSTS, :*) = [*P16*(*iSTS, :*), *P12*(*iSTS, :*), *P12*(*iSTS, :*), *P16*(*iSTS, :*)] |
| 4 | *P76*(*iSTS, :*) = [*P16*(*iSTS, :*), *P16*(*iSTS, :*), *P12*(*iSTS, :*), *P16*(*iSTS, :*), *P16*(*iSTS, :*)] |

The pilot sequences *P16*(*iSTS, :*) and *P12*(*iSTS, :*) are defined in Table 2.

Table 2: Pilot sequences P16(iSTS, :) and P12(iSTS, :) definition.

|  |  |  |
| --- | --- | --- |
| ***iSTS*** | ***P16*(*iSTS, :*)** | ***P12*(*iSTS, :*)** |
| 1 | [+1 +1 +1 -1 +1 +1 -1 +1 +1 +1 +1 -1 -1 -1 +1 -1] | [-1 +1 -1 +1 +1 -1 -1 -1 -1 -1 +1 +1] |
| 2 | [-1 -1 -1 +1 -1 -1 +1 -1 +1 +1 +1 -1 -1 -1 +1 -1] | [+1 -1 +1 +1 -1 -1 -1 -1 -1 +1 +1 -1] |
| 3 | [-1 -1 -1 +1 +1 +1 -1 +1 -1 -1 -1 +1 -1 -1 +1 -1] | [-1 +1 +1 -1 -1 -1 -1 -1 +1 +1 -1 +1] |
| 4 | [+1 +1 +1 -1 -1 -1 +1 -1 -1 -1 -1 +1 -1 -1 +1 -1] | [+1 +1 -1 -1 -1 -1 -1 +1 +1 -1 +1 -1] |
| 5 | [-1 -1 +1 -1 -1 -1 -1 +1 -1 -1 +1 -1 +1 +1 +1 -1] | [+1 -1 -1 -1 +1 -1 -1 +1 -1 +1 -1 +1] |
| 6 | [+1 +1 -1 +1 +1 +1 +1 -1 -1 -1 +1 -1 +1 +1 +1 -1] | [-1 -1 +1 -1 -1 -1 +1 +1 -1 -1 +1 +1] |
| 7 | [+1 +1 -1 +1 -1 -1 -1 +1 +1 +1 -1 +1 +1 +1 +1 -1] | [-1 -1 -1 +1 -1 +1 -1 +1 +1 +1 +1 +1] |
| 8 | [-1 -1 +1 -1 +1 +1 +1 -1 +1 +1 -1 +1 +1 +1 +1 -1] | [-1 -1 -1 -1 +1 -1 +1 -1 +1 +1 +1 -1] |

The deterministic component of common phase shift W(*iSTS*, *n*) is defined as follows:



**References:**

1. Draft P802.11ay\_D0.3