IEEE P802.11
Wireless LANs

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| 802.11[802.11az PHY Spec Text for Subcarrier Mapping in Secure Mode](relative to REVmd D0.5) |
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**Abstract**

This submission proposes P802.11az draft amendment text for the P802.11az Negotiation Protocol. The baseline documents that this proposal depends on are:

1. D0.05 of REVmd
2. D3.0 of PIEEE802.11ax

***TGaz Editor: Modify the subclause 28.3.17c in 11az D0.4.1 (Generation of Secure LTF Symbol):***

**28.3.17c Generation of Secure LTF Symbol**

When the TXVECTOR parameter LTF\_SEQUENCE is present, each sounding symbol of the HEz or VHTz LTF field shall be generated from $4P+3 $input bits that is given by TBD. The generation process is shown in Figure 28-aa.

 

Figure 28-aa Generation of Secure LTF Symbol

The number $P$ is 8, 9, 10, and 11 for 20, 40, 80, and 160 MHz transmissions, respectively. A CSD value $τ\_{CS}$ is given by

$τ\_{CS}=T\_{s}\sum\_{i=0}^{P-1}b\_{i}∙2^{i}$ (28-rr)

where $T\_{s}$ is 50, 25, 12.5, and 6.25 ns for 20, 40, 80, and 160 MHz transmissions, respectively; the bits $b\_{i}$ for $i=0,…,P-1$ are the first $P$ bits of the $4P+3 $input bits. A sequence of $2^{P}$ 8PSK symbols are generated by $P-1$ iterations. In the $p$-th iteration, two sequences $s\_{1}^{(p)}$ and $s\_{2}^{(p)}$are generated by concatenating two sequences $s\_{1}^{(p-1)}$ and $s\_{2}^{(p-1)}$ that ~~are~~ were generated in the ($p-1)$-th iteration as

$s\_{1}^{(p)}=[s\_{1}^{\left(p-1\right)},s\_{2}^{(p-1)} ]$ and (28-ss)

$s\_{1}^{(p)}=[φ\_{p}∙s\_{1}^{\left(p-1\right)},-φ\_{p}∙s\_{2}^{(p-1)} ]$, for $p=1,…,P-1$ (28-tt)

where $[a,b ]$ denotes the concatenation of two sequences $a$and $b$; $c∙d$ denotes the multiplications of a scalar $c$ with each element of sequence $d$; the initial sequences $s\_{1}^{\left(0\right)}$and $s\_{1}^{\left(0\right)}$are given by

$s\_{1}^{\left(0\right)}=exp\left(j\frac{π}{4}\sum\_{i=P}^{P+2}b\_{i}∙2^{i-P}\right)$ (28-uu)

$s\_{1}^{\left(0\right)}=exp\left(j\frac{π}{4}\sum\_{i=P+3}^{P+5}b\_{i}∙2^{i-P-3}\right)$ (28-vv)

where $b\_{i}$ is the $i$-th bit of $4P+3 $input bits. The phase rotation scalar $φ\_{k}$ $φ\_{p}$in Equation (28-tt) is given by 3 consecutive input bits as

$φ\_{p}=exp\left(j\frac{π}{4}\sum\_{i=P+3p+3}^{P+3p+5}b\_{i}∙2^{i-P-3p-3}\right)$, for $p=1,…, P-1$ (28-ww)

where $b\_{i}$ is the $i$-th bit of $4P+3 $input bits.

The ~~concatenated~~ sequences $[s\_{1}^{\left(P-1\right)},s\_{2}^{(P-1)} ]$ $s\_{1}^{\left(P-1\right)}$and $s\_{2}^{(P-1)}$~~is~~ are mapped to the non-zero subcarriers that are used by the ~~non-OFDMA HE PPDU~~ 2x HE-LTF transmission defined in subclause ~~28.3.9~~28.3.10.10~~.~~, where the subcarrier index is symmetric about 0 and defined for 4x HE-LTF. The secure LTF symbol uses only every other subcarrier in the same way as 2x HE-LTF. The subcarrier mapping is as the following:

— In a 20 MHz transmission, the mapping is given by:

 ~~TBD~~$LTF\_{20MHz}\left(-122:2:-2\right)=s\_{1}^{\left(P-1\right)}\left(3:1:63\right)$ and

$LTF\_{20MHz}\left(2:2:122\right)=s\_{2}^{\left(P-1\right)}\left(2:1:62\right)$,

where $a\left(l:m:n\right)$ denotes the vector formed sequentially by the *l*-th, (*l+m*)-th, (*l+*2*m*)-th,…, and *n*-th elements of vector $a$; *l* is the initial index; *m* is the index increment; and *n* is the last index.

— In a 40 MHz transmission, the mapping is given by:

 ~~TBD~~$LTF\_{40MHz}\left(-244:2:-4\right)=s\_{1}^{\left(P-1\right)}\left(5:1:125\right)$ and

$LTF\_{40MHz}\left(4:2:244\right)=s\_{2}^{\left(P-1\right)}\left(4:1:124\right)$,

where $a\left(l:m:n\right)$ denotes the vector formed sequentially by the *l*-th, (*l+m*)-th, (*l+*2*m*)-th,…, and *n*-th elements of vector $a$; *l* is the initial index; *m* is the index increment; and *n* is the last index.

— In an 80 MHz transmission, the mapping is given by:

 ~~TBD~~$LTF\_{80MHz}\left(-500:2:-4\right)=s\_{1}^{\left(P-1\right)}\left(5:1:253\right)$ and

$LTF\_{80MHz}\left(4:2:500\right)=s\_{2}^{\left(P-1\right)}\left(4:1:252\right)$,

where $a\left(l:m:n\right)$ denotes the vector formed sequentially by the *l*-th, (*l+m*)-th, (*l+*2*m*)-th,…, and *n*-th elements of vector $a$; *l* is the initial index; *m* is the index increment; and *n* is the last index.

— In a 160 MHz transmission, the mapping is given by:

 TBD

After the subcarrier mapping, a linear phase shift for a time-domain cyclic shift is applied to each subcarrier. The phase of the $k$-th subcarrier is rotated by $exp\left(j2πk∆\_{F}τ\_{CS}\right)$, where $∆\_{F}$ is the subcarrier spacing and $τ\_{CS}$ is given by Equation (28-rr). After the phase shift, the frequency domain signal is transformed to the time domain. A zero power guard interval is added to the transformed time domain signal as a prefix for each LTF symbol.