

CLAIMS

1. A signal generation method for generating, from a plurality of baseband signals, a plurality of signals for transmission on a common frequency band and at a common time, comprising the steps of:

5 multiplying a first baseband signal s_1 generated from a first set of bits by u , and multiplying a second baseband signal s_2 generated from a second set of bits by v , where u and v denote real numbers different from each other;

performing a change of phase on each of the first baseband signal s_1 multiplied by u and the second baseband signal s_2 multiplied by v , thus generating a
10 first post-phase-change baseband signal $u \times s_1'$ and a second post-phase-change baseband signal $v \times s_2'$; and

applying weighting according to a predetermined matrix F to the first post-phase-change baseband signal $u \times s_1'$ and to the second post-phase-change baseband signal $v \times s_2'$, thus generating the plurality of signals for transmission on
15 the common frequency band and at the common time as a first weighted signal z_1 and a second weighted signal z_2 , wherein

the first weighted signal z_1 and the second weighted signal z_2 satisfy the relation:

$$(z_1, z_2)^T = F(u \times s_1', v \times s_2')^T$$

20 and the change of phase is performed on the first baseband signal s_1 multiplied by u and the second baseband signal s_2 multiplied by v by using a phase modification value sequentially selected from among N phase modification value candidates, each of the N phase modification value candidates being selected at least once within a predetermined period.

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2. A signal generation apparatus for generating, from a plurality of baseband signals, a plurality of signals for transmission on a common frequency band and at a common time, comprising:

a power changer multiplying a first baseband signal s_1 generated from a first set of bits by u , and multiplying a second baseband signal s_2 generated from a second set of bits by v , where u and v denote real numbers different from each other;

a phase changer performing a change of phase on each of the first baseband signal s_1 multiplied by u and the second baseband signal s_2 multiplied by v , thus generating a first post-phase-change baseband signal $u \times s_1'$ and a second post-phase-change baseband signal $v \times s_2'$; and

a weighting unit applying weighting according to a predetermined matrix F to the first post-phase-change baseband signal $u \times s_1'$ and to the second post-phase-change baseband signal $v \times s_2'$, thus generating the plurality of signals for transmission on the common frequency band and at the common time as a first weighted signal z_1 and a second weighted signal z_2 , wherein

the first weighted signal z_1 and the second weighted signal z_2 satisfy the relation:

$$(z_1, z_2)^T = F(u \times s_1', v \times s_2')^T$$

and the change of phase is performed on the first baseband signal s_1 multiplied by u and the second baseband signal s_2 multiplied by v by using a phase modification value sequentially selected from among N phase modification value candidates, each of the N phase modification value candidates being selected at least once within a predetermined period.

CLAIMS

1. A signal generation method for generating, from a plurality of baseband signals, a plurality of signals for transmission on a same frequency band and at a same time, the method comprising :

applying a power change to each of a first baseband signal generated from a first set of bits and a second baseband signal generated from a second set of bits that is different from the first set of bits,

applying a phase change to the first power changed baseband signal; and

applying a precoding the first phase changed baseband signal and the second power changed baseband signal according to a predetermined matrix F, wherein

the phase change is performed using a phase change value sequentially selected from among N phase change value candidates, N being an integer equal to or greater than two and each of the N phase change value candidates being selected at least once within a predetermined period.

2. The signal generation method according to claim 1, wherein

a difference between two adjacent phase change value candidates of the N phase change value candidates is $2\pi/N$.

3. The signal generation method according to claim 1, wherein

the power change is executed by multiplying the first baseband signal by u, and multiplying the second baseband signal by v, u and v denoting real numbers different from each other.

4. The signal generation method according to claim 1, wherein

the precoding satisfy the relation:

$$(z1, z2)^T = F(s1, s2)^T$$

wherein z1 and z2 are signals after the precoding, and s1 and s2 are signals before the precoding.

5. A signal generation apparatus for generating, from a plurality of baseband signals, a plurality of signals for transmission on a same frequency band and at a same time, comprising:

a power change unit applying a power change to each of a first baseband signal generated from a first set of bits and a second baseband signal generated from a second set of bits that is different from the first set of bits,

a phase change unit applying a phase change to the first power changed baseband signal; and

a precoding unit applying a precoding to the first phase changed baseband signal and the second power changed baseband signal according to a predetermined matrix F , wherein

the phase change is performed using a phase change value sequentially selected from among N phase change value candidates, N being an integer equal to or greater than two and each of the N phase change value candidates being selected at least once within a predetermined period.

6. A signal demodulation method for demodulating a reception signal obtained by receiving a plurality of transmission signals transmitted from different antennas in a same frequency band and at a same time, wherein

the transmission signals are generated by applying a power change to each of a first baseband signal generated from a first set of bits and a second baseband signal generated from a second set of bits that is different from the first set of bits, by applying a phase change to the first power changed baseband signal, and by applying a precoding to the first phase changed baseband signal and the second power changed baseband signal according to a predetermined matrix F ,

the phase change is performed using a phase change value sequentially selected from among N phase change value candidates, N being an integer equal to or greater than two and each of the N phase change value candidates being selected at least once within a predetermined period,

the signal demodulation method comprising :
acquiring the reception signal; and
demodulating the reception signal in accordance with the sequentially selected phase change value.

7. A signal demodulation apparatus for demodulating a reception signal obtained by receiving a plurality of transmission signals transmitted from different antennas in a same frequency band and at a same time, wherein

the transmission signals are generated by applying a power change to each of a first baseband signal generated from a first set of bits and a second baseband signal generated from a second set of bits that is different from the first set of bits, by applying a phase change to the first power changed baseband signal, and by applying a precoding to the first phase changed baseband signal and the second power changed baseband signal according to a predetermined matrix F ,

the phase change is performed using a phase change value sequentially selected from among N phase change value candidates, N being an integer equal to or greater than two and each of the N phase change value candidates being selected at least once within a predetermined period,

the signal demodulation apparatus comprising:
an acquisition unit acquiring the reception signal; and
a demodulation unit demodulating the reception signal in accordance with the sequentially selected phase change value.