

CLAIMS

What is claimed is:

1. A method comprising:

receiving at a wireless transmit/receive unit (WTRU) a precoding indicator signal representing a sequence of signaling bits corresponding to a desired precoder phase value;

obtaining the desired precoder phase value by comparing the sequence of signaling bits to a plurality of predetermined sequences of signaling bits ~~in which pairs of predetermined sequences of signaling bits are opposites of each other and which correspond to precoder phase values that differ by 180 degrees; and,~~

applying a set of weighting values to a WTRU uplink signal stream transmitted over multiple antennas where the set of weighting values have a phase differential equal to the desired precoder phase value.

2. The method of claim 1 wherein the precoding indicator signal is carried on a fractional channel of a wideband code-division multiple access downlink signal transmission.
3. The method of claim 1 wherein the sequence of signaling bits represents two information bits.
4. The method of claim 3 wherein the pairs of predetermined sequences of signaling bits and the corresponding precoder phase values are in accordance with the following mapping:
sequence 00: phase 0 degrees;
sequence 11: phase 180 degrees;
sequence 01: phase 90 degrees;
sequence 10: phase 270 degrees.
5. The method of claim 1 wherein the precoding indicator signal is a modulated version of the sequence of signaling bits.

6. A method comprising:

receiving at a wireless transmit/receive unit (WTRU) a first precoding indicator signal representing a first set of signaling bits corresponding to a first precoder phase value;

applying a first set of weighting values to a WTRU uplink signal stream transmitted over multiple antennas where the first set of weighting values have a phase differential equal to the first precoder phase value;

receiving at the WTRU a second precoding indicator signal representing a second set of signaling bits corresponding to a second precoder phase value that differs from the first precoder phase value by 180 degrees and which corresponds to a second set of signaling bits ~~that is opposite the first set of signaling bits~~; and,

applying a second set of weighting values to ~~a~~ WTRU uplink signal stream where the second set of weighting values have a phase differential equal to the second precoder phase value.

7. The method of claim 6 wherein the precoding indicator signal is carried on a fractional channel of a wideband code-division multiple access downlink signal transmission.

8. The method of claim 6 wherein the first set of signal bits and the second set of signaling bits, and the respective corresponding first and second precoder phase values are either:
sequence 00, phase 0 degrees, and sequence 11, phase 180 degrees;
or
sequence 01, phase 90 degrees and sequence 10, phase 270 degrees.

9. A wireless transmit-receive apparatus comprising:

a receiver configured to receive a precoding indicator signal and to recover a corresponding sequence of signaling bits;

a control channel processor configured to obtain a desired precoder phase value from the sequence of signaling bits by comparing the sequence of signaling bits to a plurality of predetermined sequences of signaling bits ~~in which pairs of predetermined sequences of signaling bits are opposites of each other and which correspond to precoder phase values that differ by 180 degrees~~; and,

a transmitter configured to apply a set of weighting values to an uplink signal stream for transmission over multiple antennas where the set of weighting values have a phase differential equal to the desired precoder phase value.

10. The apparatus of claim 9 further comprising a memory device wherein the pairs of predetermined sequences of signaling bits and the corresponding precoder phase values are stored in accordance with the following mapping:
sequence 00: phase 0 degrees;
sequence 11: phase 180 degrees;
sequence 01: phase 90 degrees;
sequence 10: phase 270 degrees.
11. The apparatus of claim 9 wherein the control channel processor is further configured to recover the precoding indicator signal from a fractional channel of a wideband code-division multiple access downlink signal transmission.
12. A wireless base station apparatus comprising:
a processor configured to determine a desired precoder phase representing a phase offset between precoding weights of a wireless transmit-receive unit;
a control channel processor configured to convert the desired precoder phase to a sequence of signaling bits ~~where the sequence of signaling bits is selected from a plurality of predetermined sequences of signaling bits in which pairs of predetermined sequences of signaling bits are opposites of each other and which correspond to precoder phase values that differ by 180 degrees; and,~~
a transmitter configured to generate a precoding indicator signal in response to the sequence of signaling bits.
13. The apparatus of claim 12 further comprising a memory device wherein the pairs of predetermined sequences of signaling bits and the corresponding precoder phase values are stored in accordance with the following mapping:
sequence 00: phase 0 degrees;
sequence 11: phase 180 degrees;

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What is claimed is:

1. A method comprising:

receiving at a wireless transmit/receive unit (WTRU) a precoding indicator signal representing a sequence of signaling bits corresponding to a desired precoder phase value;

obtaining the desired precoder phase value by comparing the sequence of signaling bits to a plurality of predetermined sequences of signaling bits; and,

applying a set of weighting values to a WTRU uplink signal stream transmitted over multiple antennas where the set of weighting values have a phase differential equal to the desired precoder phase value;

the improvement comprising:

wherein pairs of predetermined sequences of signaling bits corresponding to precoder phase values that differ from each other by 180 degrees are opposites of each other.

2. The method of claim 1 wherein the precoding indicator signal is carried on a fractional channel of a wideband code-division multiple access downlink signal transmission.
3. The method of claim 1 wherein the sequence of signaling bits represents two information bits.
4. The method of claim 3 wherein the pairs of predetermined sequences of signaling bits and the corresponding precoder phase values are in accordance with the following mapping:
sequence 00: phase 0 degrees;
sequence 11: phase 180 degrees;
sequence 01: phase 90 degrees;
sequence 10: phase 270 degrees.
5. The method of claim 1 wherein the precoding indicator signal is a modulated version of the sequence of signaling bits.

6. A method comprising:

receiving at a wireless transmit/receive unit (WTRU) a first precoding indicator signal representing a first set of signaling bits corresponding to a first precoder phase value;

applying a first set of weighting values to a WTRU uplink signal stream transmitted over multiple antennas where the first set of weighting values have a phase differential equal to the first precoder phase value;

receiving at the WTRU a second precoding indicator signal representing a second set of signaling bits corresponding to a second precoder phase value that differs from the first precoder phase value by 180 degrees and which corresponds to a second set of signaling bits; and,

applying a second set of weighting values to the WTRU uplink signal stream transmitted over multiple antennas where the second set of weighting values have a phase differential equal to the second precoder phase value;

the improvement comprising:

wherein the second set of signaling bits is opposite the first set of signaling bits.

7. The method of claim 6 wherein the precoding indicator signal is carried on a fractional channel of a wideband code-division multiple access downlink signal transmission.

8. The method of claim 6 wherein the first set of signal bits and the second set of signaling bits, and the respective corresponding first and second precoder phase values are either:

sequence 00, phase 0 degrees, and sequence 11, phase 180 degrees;

or

sequence 01, phase 90 degrees and sequence 10, phase 270 degrees.

9. A wireless transmit-receive apparatus comprising:

a receiver configured to receive a precoding indicator signal and to recover a corresponding sequence of signaling bits;

a control channel processor configured to obtain a desired precoder phase value from the sequence of signaling bits by comparing the sequence of signaling bits to a plurality of predetermined sequences of signaling bits; and

a transmitter configured to apply a set of weighting values to an uplink signal stream for transmission over multiple antennas where the set of weighting values have a phase differential equal to the desired precoder phase value;

the improvement comprising:

wherein pairs of predetermined sequences of signaling bits that correspond to precoder phase values that differ from each other by 180 degree are opposites of each other.

10. The apparatus of claim 9 further comprising a memory device wherein the pairs of predetermined sequences of signaling bits and the corresponding precoder phase values are stored in accordance with the following mapping:
sequence 00: phase 0 degrees;
sequence 11: phase 180 degrees;
sequence 01: phase 90 degrees;
sequence 10: phase 270 degrees.
11. The apparatus of claim 9 wherein the control channel processor is further configured to recover the precoding indicator signal from a fractional channel of a wideband code-division multiple access downlink signal transmission.
12. A wireless base station apparatus comprising:
a processor configured to determine a desired precoder phase representing a phase offset between precoding weights of a wireless transmit-receive unit;
a control channel processor configured to convert the desired precoder phase to a sequence of signaling bits; and,
a transmitter configured to generate a precoding indicator signal in response to the sequence of signaling bits;
the improvement comprising:
wherein the sequence of signaling bits is selected from a plurality of predetermined sequences of signaling bits in which pairs of predetermined sequences of signaling bits that correspond to precoder phase values that differ from each other by 180 degrees are opposites of each other.
13. The apparatus of claim 12 further comprising a memory device wherein the pairs of predetermined sequences of signaling bits and the corresponding precoder phase values are stored in accordance with the following mapping:
sequence 00: phase 0 degrees;
sequence 11: phase 180 degrees;