CLAIMS

What is claimed is:

1. A method for transmitting a ranging signal in an ultra-wideband, comprising:

receiving, by a communication apparatus, a first signal;

preprocessing, by the communication apparatus, the first signal to obtain a second signal, wherein the preprocessing comprises channel estimation or power normalization;

generating, by the communication apparatus, a first ranging signal based on at least the second signal, wherein the first ranging signal meets a signal obtained after convolution processing is performed on an original ranging signal and a signal obtained after time reversal is or time reversal and conjugation processing are performed on the second signal, or the first ranging signal meets a signal obtained after time reversal is or time reversal and conjugation processing are performed on the second signal; and

sending, by the communication apparatus, at least a part of the first ranging signal, wherein at least the part of the first ranging signal supports an integrity protection function and a ranging function.

2. The method according to claim 1, wherein the first signal comprises pilot information, the preprocessing comprises channel estimation, and the second signal is a first channel impulse response from a communication apparatus to the communication apparatus; and

the generating a first ranging signal comprises:

obtaining, by the communication apparatus, a second channel impulse response after performing first processing on the first channel impulse response, wherein the first processing comprises time reversal or time reversal and conjugation processing; and

performing, by the communication apparatus, convolution processing based on the second channel impulse response and the original ranging signal.

3. The method according to claim 2, wherein the performing convolution processing based on the second channel impulse response and the original ranging signal comprises:

performing convolution processing on the original ranging signal and a response obtained after normalization processing is performed on the second channel impulse response.

4. The method according to claim 1, wherein the first signal is obtained after the original ranging signal is transmitted through a radio channel, and the preprocessing comprises power normalization; and

the generating a first ranging signal comprises:

obtaining, by the communication apparatus, the first ranging signal after performing time reversal or time reversal and conjugation processing on the second signal.

5. The method according to any one of claims 1 to 4, wherein a length of at least the part of the first ranging signal is equal to a length of the original ranging signal.

6. The method according to any one of claims 1 to 5, wherein at least the part of the first ranging signal is carried in a ranging radio frame.

7. The method according to any one of claims 1 to 6, wherein before the sending, by the communication apparatus, at least a part of the first ranging signal, the method further comprises:

receiving, by the communication apparatus, ranging configuration information, or sending, by the communication apparatus, ranging configuration information, wherein

the ranging configuration information is used to configure one or more pieces of the following information: whether a ranging signal sent in a ranging process supports the integrity protection function, a format of a ranging radio frame that carries the ranging signal, a length of the ranging signal in the ranging process, and a pulse repetition frequency mode.

8. A method for transmitting a ranging signal in an ultra-wideband, comprising:

sending, by a communication apparatus, a signal, wherein the signal is used to generate a first ranging signal;

receiving, by a communication apparatus, a signal used for ranging, wherein the signal used for ranging is obtained after at least a part of the first ranging signal is transmitted through a radio channel, and at least the part of the first ranging signal supports an integrity protection function and a ranging function;

inputting, by the communication apparatus, an original ranging signal and the signal used for ranging into a correlator to perform a correlation operation, to obtain a first moment of a maximum value output by the correlator, wherein the original ranging signal is generated based on a first sequence;

performing, by the communication apparatus, integrity check on the signal used for ranging, to obtain a check result, wherein

when a correlation operation result obtained by performing a correlation operation on a second sequence and a check sequence is greater than or equal to a preset threshold, the check result is that the integrity check on the signal used for ranging succeeds; or when a correlation operation result obtained by performing a correlation operation on the second sequence and the check sequence is less than the preset threshold, the check result is that the integrity check on the signal used for ranging fails, wherein the second sequence is the first sequence, or the second sequence is a sequence obtained after time reversal processing is performed on the first sequence; and the check sequence is obtained by performing equal-interval sampling after a real part of the signal used for ranging is obtained, a start moment of the equal-interval sampling is the first moment, and a length of the check sequence is equal to a length of the first sequence; and

if the check result is that the integrity check on the signal used for ranging succeeds, determining, by the communication apparatus, the first moment as a moment of arrival of the signal used for ranging.

9. The method according to claim 8, wherein the signal comprises pilot information, and the second sequence is the same as the first sequence.

10. The method according to claim 8, wherein the signal is the original ranging signal, and the second sequence is the sequence obtained after time reversal processing is performed on the first sequence.

11. The method according to any one of claims 8 to 10, wherein that the check sequence is obtained by performing equal-interval sampling after a real part of the signal used for ranging is obtained comprises:

the check sequence is generated based on a polarity of a sample sequence, and the sample sequence is obtained after equal-interval sampling is performed after the real part of the signal used for ranging is obtained.

12. The method according to any one of claims 8 to 11, wherein at least the part of the first ranging signal is carried in a ranging radio frame.

13. The method according to any one of claims 8 to 12, wherein before the receiving, by the communication apparatus, a signal used for ranging, the method further comprises:

sending, by the communication apparatus, ranging configuration information, or receiving, by the communication apparatus, ranging configuration information, wherein

the ranging configuration information is used to configure one or more pieces of the following information: whether a ranging signal sent in a ranging process supports the integrity protection function, a format of a ranging radio frame that carries the ranging signal, a length of the ranging signal sent in the ranging process, and a pulse repetition frequency mode.

14. A communication apparatus, configured to perform a method according to any one of claims 1 to 13.

15. A computer-readable storage medium, wherein the computer-readable storage medium stores a computer program, the computer program comprises program instructions, and when the program instructions are executed by a computer, the computer is enabled to perform a method according to any one of claims 1 to 13.