CLAIMS

1. A base station apparatus configured to communicate with a terminal apparatus, the base station apparatus comprising: modulation circuitry configured to take encoded bits of downlink data for the terminal apparatus as input and produce modulation symbols based on either of a first modulation mapping or a second modulation mapping, and transmission circuitry configured to transmit downlink control information (DCI) on a physical downlink control channel (PDCCH) and the modulation symbols on a physical downlink shared channel (PDSCH) to the terminal apparatus, wherein the DCI includes first information on a multi-user transmission indicating either of the first modulation mapping or the second modulation mapping to be used for producing the modulation symbols, in a case that the first information indicates the first modulation mapping to be used, the modulation circuitry produces the modulation symbols based on the first modulation mapping by taking the encoded bits as input and using a plurality of bits, the plurality of bits being independent of the encoded bits and not for the terminal apparatus, and in a case that the first information indicates the second modulation mapping to be used, the modulation circuitry produces the modulation symbols based on the second modulation mapping by taking the encoded bits as input without using the plurality of bits.

2. The base station apparatus according to claim 1, wherein in a case that the first information indicates the first modulation mapping to be used, sign of a positive or a negative to the first modulation mapping by a modulation scheme is given by the plurality of bits being independent of the encoded bits.

3. The base station apparatus according to claim 1, wherein the second modulation mapping is a mapping by using one of modulation schemes of QPSK, 16QAM, and 64QAM.

4. The base station apparatus according to claim 1, wherein in a case that the first information indicates the first modulation mapping to be used, the modulation circuitry is configured to produce the modulation symbols based on second information indicating a power ratio.

5. The base station apparatus according to claim 3, wherein the first modulation mapping includes at least one of the modulation schemes used in the second modulation mapping.

6. The base station apparatus according to claim 1, wherein the base station apparatus comprises higher layer processing circuitry, in a case that the higher layer processing circuitry configures the terminal apparatus with third information on multiuser superposition, the DCI includes the first

information.

7. The base station apparatus according to claim 1, wherein in a case that the transmission circuitry transmits the DCI in a specific DCI format, the DCI includes the first information.

8. The base station apparatus according to claim 1, wherein in the case that the first information indicates the first modulation mapping to be used, a number of the encoded bits is a first value, and in the case that the first information indicates the second modulation mapping to be used, a number of the encoded bits is the first value.

9. The base station apparatus according to claim 4, wherein the power ratio is a relative ratio of a power for the encoded bits.

10. A communication method for a base station apparatus configured to communicate with a terminal apparatus, the communication method comprising steps of: taking encoded bits of downlink data for the terminal apparatus as input and producing modulation symbols based on either of a first modulation mapping or a second modulation mapping, and transmitting downlink control information (DCI) on a physical downlink control channel (PDCCH) and the modulation symbols on a physical downlink shared channel (PDSCH) to the terminal apparatus, wherein the DCI includes first information on a multi-user transmission indicating either of the first modulation mapping or the second modulation mapping to be used for producing the modulation symbols, in a case that the first information indicates the first modulation mapping to be used, producing the modulation symbols based on the first modulation mapping by taking the encoded bits as input and using a plurality of bits, the plurality of bits being independent of the encoded bits and not for the terminal apparatus, and in a case that the first information indicates the second modulation mapping to be used, producing the modulation symbols based on the second modulation by taking the encoded bits as input without using the plurality of bits.

11. A terminal apparatus configured to communicate with a base station apparatus, the terminal apparatus comprising: reception circuitry configured to receive downlink control information (DCI) on a physical downlink control channel (PDCCH) and downlink data on a physical downlink shared channel (PDSCH) from the base station apparatus; and signal detection circuitry configured to demodulate modulation symbols corresponding to encoded bits of the downlink data on the PDSCH based on either of a first modulation mapping or a second modulation mapping which a modulation mapper includes, and detect the downlink data, wherein the DCI includes first information on a multi-user transmission indicating either of the first modulation mapping or the second modulation

mapping to be used for producing the modulation symbols, in a case that the first information indicates the first modulation mapping to be used, the modulation symbols are given based on the first modulation mapping by taking the encoded bits as input and a plurality of bits, the plurality of bits being independent of the encoded bits and not for the terminal apparatus, and in a case that the first information indicates the second modulation mapping to be used, the modulation symbols are given based on the second modulation mapping by taking the encoded bits as input without using the plurality of bits.

12. The terminal apparatus according to claim 11, wherein in a case that the first information indicates the first modulation mapping to be used, sign of a positive or a negative to the first modulation mapping by a modulation scheme is given by the plurality of bits being independent of the encoded bits.

13. The terminal apparatus according to claim 11, wherein the second modulation mapping is a mapping by using one of modulation schemes of QPSK, 16QAM, and 64QAM.

14. The terminal apparatus according to claim 11, wherein in a case that the first information indicates the first modulation mapping to be used, the signal detection circuitry is configured to produce the modulation symbols based on second information indicating a power ratio.

15. The terminal apparatus according to claim 13, wherein the first modulation mapping includes at least one of the modulation schemes used in the second modulation mapping.

16. The terminal apparatus according to claim 11, wherein the terminal apparatus comprises higher layer processing circuitry, in a case that the higher layer processing circuitry is configured with third information on multiuser superposition, the DCI includes the first information.

17. The terminal apparatus according to claim 11, wherein in a case that the reception circuitry receives the DCI in a specific DCI format, the DCI includes the first information.

18. The terminal apparatus according to claim 11, wherein in the case that the first information indicates the first modulation mapping to be used, a number of the encoded bits is a first value, and in the case that the first information indicates the second modulation mapping to be used, a number of the encoded bits is the first value.

19. The terminal apparatus according to claim 14, wherein the power ratio is a relative ratio of a

power for the encoded bits.

20. A communication method for a terminal apparatus configured to communicate with a base station apparatus, the communication method comprising steps of: receiving downlink control information (DCI) on a physical downlink control channel (PDCCH) and downlink data on a physical downlink shared channel (PDSCH) from the base station apparatus; and demodulating modulation symbols corresponding to encoded bits of the downlink data on the PDSCH based on either of a first modulation mapping or a second modulation mapping which a modulation mapper includes, and detecting the downlink data, wherein the DCI includes first information on a multi-user transmission indicating either of the first modulation mapping or the second modulation mapping to be used for producing the modulation symbol, in a case that the first information indicates the first modulation mapping to be used, the modulation symbols are given based on the first modulation mapping by taking the encoded bits as input and using a plurality of bits, the plurality of bits being independent of the encoded bits and not for the terminal apparatus, and in a case that the first information indicates the second modulation mapping to be used, the modulation symbols are given based on the second modulation mapping by taking the encoded bits as input without using the plurality of bits.