CLAIMS

1. A point cloud encoding method, wherein the method comprises:

obtaining auxiliary information of a to-be-encoded point cloud patch; and

encoding the auxiliary information of the to-be-encoded patch and a first index that indicates a type of the to-be-encoded patch into a bitstream, wherein

the first index is a first value, indicating that the to-be-encoded patch is a first-type patch, and the auxiliary information of the to-be-encoded patch comprises three-dimensional information, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information; or

the first index is a second value, indicating that the to-be-encoded patch is a second-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, and index information of a reference patch of the to-be-encoded patch, but does not include the rotation transformation information and the normal coordinate axis information; or

the first index is a third value, indicating that the to-be-encoded patch is a third-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information.

2. The method according to claim 1, wherein the first value, the second value, and the third value are binary numbers 10, 11, and 00 respectively; or

the first value, the second value, and the third value are binary numbers 11, 10, and 00 respectively.

3. The method according to claim 1 or 2, wherein when the first index of the to-be-encoded patch is the third value, and the to-be-encoded patch is the first patch in a current point cloud frame to which the to-be-encoded patch belongs, the current point cloud frame is the first point cloud frame.

4. The method according to any one of claims 1 to 3, wherein the reference patch of the to-be-encoded patch is comprised in a reference frame of the current point cloud frame.

5. The method according to any one of claims 1 to 4, wherein the first-type patch is a global matched patch in a current group, the second-type patch is a local matched patch in the current group, and the third-type patch is an unmatched patch in the current group.

6. A point cloud decoding method, wherein the method comprises:

parsing a first index that indicates a type of a to-be-decoded point cloud patch from a

bitstream;

parsing auxiliary information of the to-be-decoded patch from the bitstream when the first index is a first value, wherein the auxiliary information comprises three-dimensional information of the to-be-decoded patch, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information of the to-be-decoded patch; or

parsing auxiliary information of the to-be-decoded patch from the bitstream when the first index is a second value, wherein the auxiliary information comprises the two-dimensional information and the three-dimensional information of the to-be-decoded patch, and index information of a reference patch of the to-be-decoded patch, but does not include the rotation transformation information and the normal coordinate axis information of the to-be-decoded patch; or

parsing auxiliary information of the to-be-decoded patch from the bitstream when the first index is a third value, wherein the auxiliary information comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information of the to-be-decoded patch; and

reconstructing the to-be-decoded patch based on the auxiliary information of the to-be-decoded patch.

7. The method according to claim 6, wherein the first value, the second value, and the third value are binary numbers 10, 11, and 00 respectively; or

the first value, the second value, and the third value are binary numbers 11, 10, and 00 respectively.

8. The method according to claim 6 or 7, wherein the method further comprises:

when the to-be-decoded patch is the first patch, and the first index is the third value, determining that a current point cloud frame to which the to-be-decoded patch belongs is the first point cloud frame.

9. The method according to any one of claims 6 to 8, wherein the parsing a first index of a to-be-decoded patch from a bitstream comprises:

parsing the first index of the to-be-decoded patch from the bitstream when the to-be-decoded patch is the first patch in the current point cloud frame; or

parsing a plurality of first indexes of a plurality of patches comprised in the current point cloud frame from the bitstream when the to-be-decoded patch is the first patch in the current point cloud frame, wherein the plurality of parsed first indexes comprise the first index of the to-be-decoded patch.

10. The method according to any one of claims 6 to 9, wherein when the first index is the first value, the method further comprises:

obtaining the two-dimensional information, the rotation transformation information, and the normal axis information of the to-be-decoded patch based on auxiliary information of the reference patch of the to-be-decoded patch; and

the reconstructing the to-be-decoded patch based on the auxiliary information of the to-be-decoded patch comprises:

reconstructing the to-be-decoded patch based on the two-dimensional information, the three-dimensional information, the normal axis information, and the rotation transformation information of the to-be-decoded patch.

11. The method according to any one of claims 6 to 9, wherein when the first index is the second value, the method further comprises:

obtaining the rotation transformation information and the normal axis information of the to-be-decoded patch based on the index information of the reference patch of the to-be-decoded patch; and

the reconstructing the to-be-decoded patch based on the auxiliary information of the to-be-decoded patch comprises:

reconstructing the to-be-decoded patch based on the two-dimensional information, the three-dimensional information, the normal axis information, and the rotation transformation information of the to-be-decoded patch.

12. The method according to any one of claims 6 to 11, wherein the reference patch of the to-be-decoded patch is comprised in a reference frame of the current point cloud frame.

13. A point cloud encoding method, wherein the method comprises:

obtaining auxiliary information of a to-be-encoded point cloud patch; and

encoding the auxiliary information of the to-be-encoded patch and a first index that indicates a type of the to-be-encoded patch into a bitstream, wherein

the first index is a first value, indicating that the to-be-encoded patch is a first-type patch, and information encoded into the bitstream further comprises a second index, wherein the second index is a fourth value, indicating that three-dimensional information of the to-be-encoded patch is not encoded into the bitstream, or the second index is a fifth value, indicating that three-dimensional information of the to-be-encoded patch is encoded into the bitstream, and the auxiliary information of the to-be-encoded patch comprises the three-dimensional information, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information; or

the first index is a second value, indicating that the to-be-encoded patch is a second-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, and index information of a reference patch of the to-be-encoded patch, but does not include the rotation transformation information and the normal coordinate axis information; or

the first index is a third value, indicating that the to-be-encoded patch is a third-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information.

14. A point cloud decoding method, wherein the method comprises:

parsing a first index of a to-be-decoded point cloud patch from a bitstream;

parsing a second index of the to-be-decoded patch from the bitstream when the first index that indicates a type is a first value; and

using auxiliary information of a reference patch of the to-be-decoded patch as auxiliary information of the to-be-decoded patch when the second index is a fourth value; or parsing auxiliary information of the to-be-decoded patch from the bitstream when the second index is a fifth value, wherein the auxiliary information comprises three-dimensional information of the to-be-decoded patch, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information of the to-be-decoded patch; or

parsing auxiliary information of the to-be-decoded patch from the bitstream when the first index is a second value, wherein the auxiliary information comprises the two-dimensional information and the three-dimensional information of the to-be-decoded patch, and index information of a reference patch of the to-be-decoded patch, but does not include the rotation transformation information and the normal coordinate axis information of the to-be-decoded patch; or

parsing auxiliary information of the to-be-decoded patch from the bitstream when the first index is a third value, wherein the auxiliary information comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information of the to-be-decoded patch; and

reconstructing the to-be-decoded patch based on the auxiliary information of the to-be-decoded patch.

15. A point cloud encoding apparatus, wherein the apparatus comprises:

a point cloud patch information obtaining module, configured to obtain auxiliary

information of a to-be-encoded patch; and

an auxiliary information encoding module, configured to encode the auxiliary information of the to-be-encoded patch and a first index that indicates a type of the to-be-encoded patch into a bitstream, wherein

the first index is a first value, indicating that the to-be-encoded patch is a first-type patch, and the auxiliary information of the to-be-encoded patch comprises three-dimensional information, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information; or

the first index is a second value, indicating that the to-be-encoded patch is a second-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, and index information of a reference patch of the to-be-encoded patch, but does not include the rotation transformation information and the normal coordinate axis information; or

the first index is a third value, indicating that the to-be-encoded patch is a third-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information.

16. The apparatus according to claim 15, wherein the first value, the second value, and the third value are binary numbers 10, 11, and 00 respectively; or

the first value, the second value, and the third value are binary numbers 11, 10, and 00 respectively.

17. The apparatus according to claim 15 or 16, wherein when the first index of the to-be-encoded patch is the third value, and the to-be-encoded patch is the first patch in a current point cloud frame to which the to-be-encoded patch belongs, the current point cloud frame is the first point cloud frame.

18. The apparatus according to any one of claims 15 to 17, wherein the reference patch of the to-be-encoded patch is comprised in a reference frame of the current point cloud frame.

19. The apparatus according to any one of claims 15 to 18, wherein the first-type patch is a global matched patch in a current group, the second-type patch is a local matched patch in the current group, and the third-type patch is an unmatched patch in the current group.

20. A point cloud decoding apparatus, wherein the apparatus comprises:

an auxiliary information decoding module, configured to parse a first index that indicates a type of a to-be-decoded point cloud patch from a bitstream, wherein

the auxiliary information decoding module is further configured to: parse auxiliary

information of the to-be-decoded patch from the bitstream when the first index is a first value, wherein the auxiliary information comprises three-dimensional information of the to-be-decoded patch, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information of the to-be-decoded patch; or parse auxiliary information of the to-be-decoded patch from the bitstream when the first index is a second value, wherein the auxiliary information comprises the two-dimensional information and the three-dimensional information of the to-be-decoded patch, and index information of a reference patch of the to-be-decoded patch, but does not include the rotation transformation information and the normal coordinate axis information of the to-be-decoded patch; or parse auxiliary information of the to-be-decoded patch from the bitstream when the first index is a third value, wherein the auxiliary information comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information of the to-be-decoded patch; and

a reconstruction module, configured to reconstruct the to-be-decoded patch based on the auxiliary information of the to-be-decoded patch.

21. The apparatus according to claim 20, wherein the first value, the second value, and the third value are binary numbers 10, 11, and 00 respectively; or

the first value, the second value, and the third value are binary numbers 11, 10, and 00 respectively.

22. The apparatus according to claim 20 or 21, wherein the auxiliary information decoding module is further configured to:

when the to-be-decoded patch is the first patch, and the first index is the third value, determine that a current point cloud frame to which the to-be-decoded patch belongs is the first point cloud frame.

23. The apparatus according to any one of claims 20 to 22, wherein the auxiliary information decoding module is further configured to:

parse the first index of the to-be-decoded patch from the bitstream when the to-be-decoded patch is the first patch in the current point cloud frame; or parse a plurality of first indexes of a plurality of patches comprised in the current point cloud frame from the bitstream when the to-be-decoded patch is the first patch in the current point cloud frame, wherein the plurality of parsed first indexes comprise the first index of the to-be-decoded patch.

24. The apparatus according to any one of claims 20 to 23, wherein when the first index is the first value, the auxiliary information decoding module is further configured to:

obtain the two-dimensional information, the rotation transformation information, and the

normal axis information of the to-be-decoded patch based on auxiliary information of the reference patch of the to-be-decoded patch; and

the reconstruction module is further configured to:

reconstruct the to-be-decoded patch based on the two-dimensional information, the three-dimensional information, the normal axis information, and the rotation transformation information of the to-be-decoded patch.

25. The apparatus according to any one of claims 20 to 23, wherein when the first index is the second value, the auxiliary information decoding module is further configured to:

obtain the rotation transformation information and the normal axis information of the to-be-decoded patch based on the index information of the reference patch of the to-be-decoded patch; and

the reconstruction module is further configured to:

reconstruct the to-be-decoded patch based on the two-dimensional information, the three-dimensional information, the normal axis information, and the rotation transformation information of the to-be-decoded patch.

26. The apparatus according to any one of claims 20 to 25, wherein the reference patch of the to-be-decoded patch is comprised in a reference frame of the current point cloud frame.

27. A point cloud encoding apparatus, wherein the apparatus comprises:

a point cloud patch information obtaining module, configured to obtain auxiliary information of a to-be-encoded patch; and

an auxiliary information encoding module, configured to encode the auxiliary information of the to-be-encoded patch and a first index that indicates a type of the to-be-encoded patch into a bitstream, wherein

the first index is a first value, indicating that the to-be-encoded patch is a first-type patch, and information encoded into the bitstream further comprises a second index, wherein the second index is a fourth value, indicating that three-dimensional information of the to-be-encoded patch is not encoded into the bitstream, or the second index is a fifth value, indicating that three-dimensional information of the to-be-encoded patch is encoded into the bitstream, and the auxiliary information of the to-be-encoded patch comprises the three-dimensional information, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information; or

the first index is a second value, indicating that the to-be-encoded patch is a second-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, and index information of a reference patch of

the to-be-encoded patch, but does not include the rotation transformation information and the normal coordinate axis information; or

the first index is a third value, indicating that the to-be-encoded patch is a third-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information.

28. A point cloud decoding apparatus, wherein the apparatus comprises:

an auxiliary information decoding module, configured to parse a first index that indicates a type of a to-be-decoded point cloud patch from a bitstream, wherein

the auxiliary information decoding module is further configured to: parse a second index of the to-be-decoded patch from the bitstream when the first index is a first value, and use auxiliary information of a reference patch of the to-be-decoded patch as auxiliary information of the to-be-decoded patch when the second index is a fourth value, or parse auxiliary information of the to-be-decoded patch from the bitstream when the second index is a fifth value, wherein the auxiliary information comprises three-dimensional information of the to-be-decoded patch, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information of the to-be-decoded patch; or parse auxiliary information of the to-be-decoded patch from the bitstream when the first index is a second value, wherein the auxiliary information comprises the two-dimensional information and the three-dimensional information of the to-be-decoded patch, and index information of a reference patch of the to-be-decoded patch, but does not include the rotation transformation information and the normal coordinate axis information of the to-be-decoded patch; or parse auxiliary information of the to-be-decoded patch from the bitstream when the first index is a third value, wherein the auxiliary information comprises the two-dimensional information, the three-dimensional information, rotation transformation information, and the normal axis information of the to-be-decoded patch; and

a reconstruction module, configured to reconstruct the to-be-decoded patch based on the auxiliary information of the to-be-decoded patch.

29. A point cloud encoding method, wherein the method comprises:

obtaining auxiliary information of a to-be-encoded point cloud patch; and

encoding the auxiliary information of the to-be-encoded patch and a syntax element of a first index that indicates a type of the to-be-encoded patch into a bitstream, wherein:

the first index is a first value, indicating that the to-be-encoded patch is a first-type patch, and the auxiliary information of the to-be-encoded patch comprises three-dimensional

information, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information; or

the first index is a second value, indicating that the to-be-encoded patch is a second-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, and index information of a reference patch of the to-be-encoded patch, but does not include the rotation transformation information and the normal coordinate axis information; or

the first index is a third value, indicating that the to-be-encoded patch is a third-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information,

wherein the syntax element comprises a first syntax element, wherein:

when the first syntax element indicates that the to-be-encoded patch has a reference patch,

the syntax element encoded into the bitstream further comprises a second syntax element, a value of the second syntax element is true, indicating that two-dimensional information of the to-be-encoded patch is encoded into the bitstream but three-dimensional information of the to-be-encoded patch is not encoded into the bitstream, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information; or

the syntax element encoded into the bitstream further comprises a second syntax element and a third syntax element, a value of the second syntax element is false and a value of the third syntax element is true, indicating that two-dimensional information of the to-be-encoded patch is not encoded into the bitstream but three-dimensional information of the to-be-encoded patch is encoded into the bitstream, and the auxiliary information of the to-be-encoded patch comprises the three-dimensional information; or

the syntax element encoded into the bitstream further comprises a second syntax element and a third syntax element, a value of the second syntax element is false and a value of the third syntax element is false, indicating that two-dimensional information of the to-be-encoded patch is not encoded into the bitstream and three-dimensional information of the to-be-encoded patch is not encoded into the bitstream.

30. The method according to claim 29, wherein when the first syntax element indicates that the to-be-encoded patch does not have a reference patch, the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, rotation transformation information, and normal axis information.

31. The method according to claim 29 or 30, wherein when the first syntax element

indicates that the to-be-encoded patch does not have a reference patch, and the to-be-encoded patch is the first patch in a current point cloud frame to which the to-be-encoded patch belongs, the current point cloud frame is the first point cloud frame.

32. The method according to any one of claims 29 to 31, wherein the reference patch of the to-be-encoded patch is comprised in a reference frame of the current point cloud frame.

33. The method according to claim 32, wherein a location of the to-be-encoded patch in the current point cloud frame is the same as a location of the reference patch of the to-be-encoded patch in the reference frame of the current point cloud frame.

34. A point cloud decoding method, wherein the method comprises:

parsing a first syntax element of a syntax element of a to-be-decoded point cloud patch from a bitstream;

parsing a second syntax element of the to-be-decoded patch from the bitstream or parsing a second syntax element and a third syntax element of the to-be-decoded patch from the bitstream when the first syntax element indicates that the to-be-decoded patch has a reference patch;

when a value of the second syntax element is true, parsing two-dimensional information of the to-be-decoded patch from the bitstream, and obtaining three-dimensional information of the to-be-decoded patch based on three-dimensional information of the reference patch of the to-be-decoded patch as; or

when a value of the second syntax element is false and a value of the third syntax element is true, parsing three-dimensional information of the to-be-decoded patch from the bitstream, and obtaining two-dimensional information of the to-be-decoded patch based on two-dimensional information of the reference patch of the to-be-decoded patch; or

when a value of the second syntax element is false and a value of the third syntax element is false, obtaining two-dimensional information of the to-be-decoded patch based on two-dimensional information of the reference patch of the to-be-decoded patch, and obtaining three-dimensional information of the to-be-decoded patch based on three-dimensional information of the reference patch of the to-be-decoded patch; and

reconstructing the to-be-decoded patch based on auxiliary information of the to-be-decoded patch, wherein the auxiliary information of the to-be-decoded patch comprises the two-dimensional information of the to-be-decoded patch and the three-dimensional information of the to-be-decoded patch,

wherein the syntax element is of a first index that indicates a type of the to-be-encoded patch into a bitstream, wherein:

the first index is a first value, indicating that the to-be-encoded patch is a first-type patch, and the auxiliary information of the to-be-encoded patch comprises three-dimensional information, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information; or

the first index is a second value, indicating that the to-be-encoded patch is a second-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, and index information of a reference patch of the to-be-encoded patch, but does not include the rotation transformation information and the normal coordinate axis information; or

the first index is a third value, indicating that the to-be-encoded patch is a third-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information.

35. The method according to claim 34, wherein the method further comprises:

parsing the auxiliary information of the to-be-decoded patch from the bitstream when the first syntax element indicates that the to-be-decoded patch does not have a reference patch, wherein the auxiliary information of the to-be-decoded patch comprises the two-dimensional information, the three-dimensional information, rotation transformation information, and normal axis information.

36. The method according to claim 34 or 35, wherein the method further comprises:

when the to-be-decoded patch is the first patch, and the first syntax element indicates that the to-be-decoded patch does not have a reference patch, determining that a current point cloud frame to which the to-be-decoded patch belongs is the first point cloud frame.

37. The method according to any one of claims 34 to 36, wherein the parsing a first syntax element of a to-be-decoded point cloud patch from a bitstream comprises:

parsing the first syntax element of the to-be-decoded patch from the bitstream when the to-be-decoded patch is the first patch in the current point cloud frame; or

parsing a plurality of first syntax elements of a plurality of patches comprised in the current point cloud frame from the bitstream when the to-be-decoded patch is the first patch in the current point cloud frame, wherein the plurality of parsed first syntax elements comprise the first syntax element of the to-be-decoded patch.

38. The method according to any one of claims 34 to 37, wherein the reference patch of the to-be-decoded patch is comprised in a reference frame of the current point cloud frame.

39. The method according to claim 38, wherein a location of the to-be-decoded patch in

the current point cloud frame is the same as a location of the reference patch of the to-be-decoded patch in the reference frame of the current point cloud frame.

40. A point cloud encoding apparatus, wherein the apparatus comprises:

a point cloud patch information obtaining module, configured to obtain auxiliary information of a to-be-encoded patch; and

an auxiliary information encoding module, configured to encode the auxiliary information of the to-be-encoded patch and a syntax element of a first index that indicates a type of the to-be-encoded patch into a bitstream, wherein:

the first index is a first value, indicating that the to-be-encoded patch is a first-type patch, and the auxiliary information of the to-be-encoded patch comprises three-dimensional information, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information; or

the first index is a second value, indicating that the to-be-encoded patch is a second-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, and index information of a reference patch of the to-be-encoded patch, but does not include the rotation transformation information and the normal coordinate axis information; or

the first index is a third value, indicating that the to-be-encoded patch is a third-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, the rotation transformation information, and the normal axis information,

wherein the syntax element comprises a first syntax element, wherein:

when the first syntax element indicates that the to-be-encoded patch has a reference patch,

the syntax element encoded into the bitstream further comprises a second syntax element, a value of the second syntax element is true, indicating that two-dimensional information of the to-be-encoded patch is encoded into the bitstream but three-dimensional information of the to-be-encoded patch is not encoded into the bitstream, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information; or

the syntax element encoded into the bitstream further comprises a second syntax element and a third syntax element, a value of the second syntax element is false and a value of the third syntax element is true, indicating that two-dimensional information of the to-be-encoded patch is not encoded into the bitstream but three-dimensional information of the to-be-encoded patch is encoded into the bitstream, and the auxiliary information of the to-be-encoded patch comprises the three-dimensional information; or

the syntax element encoded into the bitstream further comprises a second syntax element and a third syntax element, a value of the second syntax element is false and a value of the third syntax element is false, indicating that two-dimensional information of the to-be-encoded patch is not encoded into the bitstream and three-dimensional information of the to-be-encoded patch is not encoded into the bitstream.

41. The apparatus according to claim 40, wherein when the first syntax element indicates that the to-be-encoded patch does not have a reference patch, the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, rotation transformation information, and normal axis information.

42. The apparatus according to claim 40 or 41, wherein when the first syntax element indicates that the to-be-encoded patch does not have a reference patch, and the to-be-encoded patch is the first patch in a current point cloud frame to which the to-be-encoded patch belongs, the current point cloud frame is the first point cloud frame.

43. The apparatus according to any one of claims 40 to 42, wherein the reference patch of the to-be-encoded patch is comprised in a reference frame of the current point cloud frame.

44. The apparatus according to claim 43, wherein a location of the to-be-encoded patch in the current point cloud frame is the same as a location of the reference patch of the to-be-encoded patch in the reference frame of the current point cloud frame.

45. A point cloud decoding apparatus, wherein the apparatus comprises:

an auxiliary information decoding module, configured to parse a first syntax element of a syntax element of a to-be-decoded point cloud patch from a bitstream, wherein the syntax element is of a first index that indicates a type of the to-be-encoded patch into a bitstream, wherein:

the first index is a first value, indicating that the to-be-encoded patch is a first-type patch, and the auxiliary information of the to-be-encoded patch comprises three-dimensional information, but does not include two-dimensional information, rotation transformation information and normal coordinate axis information; or

the first index is a second value, indicating that the to-be-encoded patch is a second-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional information, the three-dimensional information, and index information of a reference patch of the to-be-encoded patch, but does not include the rotation transformation information and the normal coordinate axis information; or

the first index is a third value, indicating that the to-be-encoded patch is a third-type patch, and the auxiliary information of the to-be-encoded patch comprises the two-dimensional

information, the three-dimensional information, the rotation transformation information, and the normal axis information,

wherein:

the auxiliary information decoding module is further configured to: parse a second syntax element of the to-be-decoded patch from the bitstream or parse a second syntax element and a third syntax element of the to-be-decoded patch from the bitstream when the first syntax element indicates that the to-be-decoded patch has a reference patch;

when a value of the second syntax element is true, parse two-dimensional information of the to-be-decoded patch from the bitstream, and obtain three-dimensional information of the to-be-decoded patch based on three-dimensional information of the reference patch of the to-be-decoded patch; or

when a value of the second syntax element is false and a value of the third syntax element is true, parse three-dimensional information of the to-be-decoded patch from the bitstream, and obtain two-dimensional information of the to-be-decoded patch based on two-dimensional information of the reference patch of the to-be-decoded patch ; or

when a value of the second syntax element is false and a value of the third syntax element is false, obtain two-dimensional information of the to-be-decoded patch based on two-dimensional information of the reference patch of the to-be-decoded patch, and obtain three-dimensional information of the to-be-decoded patch based on three-dimensional information of the reference patch of the to-be-decoded patch; and

a reconstruction module, configured to reconstruct the to-be-decoded patch based on auxiliary information of the to-be-decoded patch, wherein the auxiliary information of the to-be-decoded patch comprises the two-dimensional information of the to-be-decoded patch and the three-dimensional information of the to-be-decoded patch.

46. The apparatus according to claim 45, wherein the auxiliary information decoding module is further configured to:

parse the auxiliary information of the to-be-decoded patch from the bitstream when the first syntax element indicates that the to-be-decoded patch does not have a reference patch, wherein the auxiliary information of the to-be-decoded patch comprises the two-dimensional information, the three-dimensional information, rotation transformation information, and normal axis information.

47. The apparatus according to claim 45 or 46, wherein the auxiliary information decoding module is further configured to:

when the to-be-decoded patch is the first patch, and the first syntax element indicates that

the to-be-decoded patch does not have a reference patch, determine that a current point cloud frame to which the to-be-decoded patch belongs is the first point cloud frame.

48. The apparatus according to any one of claims 45 to 47, wherein the auxiliary information decoding module is further configured to:

parse the first syntax element of the to-be-decoded patch from the bitstream when the to-be-decoded patch is the first patch in the current point cloud frame; or

parse a plurality of first syntax elements of a plurality of patches comprised in the current point cloud frame from the bitstream when the to-be-decoded patch is the first patch in the current point cloud frame, wherein the plurality of parsed first syntax elements comprise the first syntax element of the to-be-decoded patch.

49. The apparatus according to any one of claims 45 to 48, wherein the reference patch of the to-be-decoded patch is comprised in a reference frame of the current point cloud frame.

50. The apparatus according to claim 49, wherein a location of the to-be-decoded patch in the current point cloud frame is the same as a location of the reference patch of the to-be-decoded patch in the reference frame of the current point cloud frame.

51. A computer readable storage medium, comprising program code, wherein when the program code is run on a computer, the computer is enabled to perform the point cloud encoding method according to any one of claims 1 to 5, claim 13, or claims 29 to 33.

52. A computer readable storage medium, comprising program code, wherein when the program code is run on a computer, the computer is enabled to perform the point cloud decoding method according to any one of claims 6 to 12, claim 14, or claims 34 to 39.