WHAT IS CLAIMED IS:

1. A method of point cloud geometry decoding in a point cloud decoder, comprising:

receiving, by processing circuitry and from a coded bitstream for a point cloud that includes a set of points in a three-dimensional (3D) space, first signaling information being indicative of partition information of the point cloud;

determining, by the processing circuitry and from the coded bitstream for the point cloud, second signaling information based on the first signaling information indicating a first value, the second signaling information being indicative of a partition mode of the set of points in the 3D space;

receiving third signaling information that indicates whether the 3D space is an asymmetric cuboid;

determining dimensions of the 3D space that are signaled along x, y, and z directions based on the third signaling information indicating that the 3D space is the asymmetric cuboid;

partitioning, by the processing circuitry, the 3D space based on the determined dimensions of the 3D space and based on the partition mode of the 3D space indicated by the second signaling information; and

reconstructing, by the processing circuitry, the point cloud based on the partitioned 3D space.

2. The method of claim 1, further comprising:

determining the partition mode to be a pre-defined Quad-tree and Binary-tree (QtBt) partition based on the second signaling information indicating a second value.

3. The method of claim 1, further comprising:

receiving 3-bit signaling information for each of a plurality of partition levels in the partition mode based on the second signaling information indicating the first value, the 3-bit signaling information for each of the plurality of partition levels being indicative of partition directions along x, y, and z directions for the respective partition level in the partition mode.

4. The method of claim 3, wherein the 3-bit signaling information is determined based on the dimensions of the 3D space.

5. The method of claim 1, further comprising:

determining the partition mode based on the first signaling information indicating a second value, the partition mode including a respective octree-partition in each of a plurality of partition levels in the partition mode.

6. A method of point cloud geometry decoding in a point cloud decoder, comprising:

receiving, by processing circuitry and from a coded bitstream for a point cloud that includes a set of points in a three-dimensional (3D) space, first signaling information being indicative of partition information of the point cloud;

receiving second signaling information that indicates whether the 3D space is an asymmetric cuboid;

determining dimensions of the 3D space that are signaled along x, y, and z directions based on the second signaling information indicating that the 3D space is the asymmetric cuboid;

partitioning, by the processing circuitry, the 3D space based on the determined dimensions of the 3D space and based on a partition mode of the 3D space indicated by the first signaling information, the partition mode including a plurality of partition levels; and

reconstructing, by the processing circuitry, the point cloud based on the partitioned 3D space.

7. The method of claim 6, further comprising:

receiving 3-bit signaling information for each of the plurality of partition levels in the partition mode based on the first signaling information indicating a first value, the 3-bit signaling information for each of the plurality of partition levels being indicative of partition directions along x, y, and z directions for the respective partition level in the partition mode.

8. The method of claim 7, wherein the 3-bit signaling information is determined based on the dimensions of the 3D space.

9. The method of claim 6, further comprising:

determining a partition mode that includes a respective octree-partition in each of the plurality of partition levels as the partition mode based on the first signaling information indicating a second value.

10. The method of claim 9, wherein:

the second signaling information indicating the 3D space is the asymmetric cuboid when the second signaling information is a first value, and the second signaling information indicating the 3D space is a symmetric cuboid when the second signaling information is a second value.

11. The method of claim 10, further comprising:

based on the first signaling information indicating the second value and the second signaling information indicating the first value, determining the partition mode to include a respective octree-partition in each of first partition levels in the plurality of partition levels of the partition mode; and

determining a partition type and a partition direction in a last partition level in the plurality of partition levels of the partition mode according to conditions as follows:

Partition type and direction	Qt along x-y axes	Qt along x-z axes	Qt along y-z axes
Condition	$d_z = 0 < d_x = d_y$	$d_y = 0 < d_x = d_z$	$d_x = 0 < d_y = d_z$
Partition type and direction	Bt along x axis	Bt along y axis	Bt along z axis
Condition	$d_y = 0 \leq d_z < d_x$	$d_x = 0 \leq d_z < d_y$	$d_x = 0 \leq d_y < d_z$
	$d_z = 0 \leq d_y < d_x$	$d_z = 0 \leq d_x < d_y$	$d_y = 0 \leq d_x < d_z$

, wherein d_x, d_y, and d_z are log2 sizes of the 3D space in the x, y, and z directions, respectively.

12. An apparatus of processing point cloud data, comprising:

processing circuitry configured to:

receive first signaling information from a coded bitstream for a point cloud that includes a set of points in a three-dimensional (3D) space, the first signaling information being indicative of partition information of the point cloud;

receive second signaling information that indicates whether the 3D space is an asymmetric cuboid;

determine dimensions of the 3D space that are signaled along x, y, and z directions based on the second signaling information indicating that the 3D space is the asymmetric cuboid;

partition the 3D space based on the determined dimensions of the 3D space and based on a partition mode of the 3D space indicated by the first signaling information, the partition mode including a plurality of partition levels; and

reconstruct the point cloud based on the partitioned 3D space.

13. The apparatus of claim 12, wherein the processing circuitry is further configured to:

receive 3-bit signaling information for each of the plurality of partition levels in the partition mode based on the first signaling information indicating a first value, the 3-bit signaling information for each of the plurality of partition levels being indicative of partition directions along x, y, and z directions for the respective partition level in the partition mode.

14. The apparatus of claim 13, wherein the 3-bit signaling information is determined based on the dimensions of the 3D space.

15. The apparatus of claim 12, wherein the processing circuitry is further configured to:

determine a partition mode that includes a respective octree-partition in each of the plurality of partition levels as the partition mode based on the first signaling information indicating a second value.

16. The apparatus of claim 15, wherein:

the second signaling information indicating the 3D space is the asymmetric cuboid when the second signaling information is a first value, and the second signaling information indicating the 3D space is a symmetric cuboid when the second signaling information is a second value.

17. The apparatus of claim 16, wherein the processing circuitry is further configured to:

based on the first signaling information indicating the second value and the second signaling information indicating the first value, determine the partition mode to include a respective octree-partition in each of first partition levels in the plurality of partition levels of the partition mode; and

determining a partition type and a partition direction in a last partition level in the plurality of partition levels of the partition mode according to conditions as follows:

Partition type and direction	Qt along x-y axes	Qt along x-z axes	Qt along y-z axes

Condition	$d_z = 0 < d_x = d_y$	$d_y = 0 < d_x = d_z$	$d_x = 0 < d_y = d_z$
Partition type and direction	Bt along x axis	Bt along y axis	Bt along z axis
Condition	$d_y = 0 \leq d_z < d_x$	$d_x = 0 \leq d_z < d_y$	$d_x = 0 \leq d_y < d_z$
	$d_z = 0 \leq d_y < d_x$	$d_z = 0 \leq d_x < d_y$	$d_y = 0 \leq d_x < d_z$

, wherein d_x, d_y, and d_z are log2 sizes of the 3D space in the x, y, and z directions, respectively.