WHAT IS CLAIMED IS:

1. A method of transmitting point cloud data, the method comprises:

encoding the point cloud data including geometry and attribute, the geometry represents positions of points of the point cloud data, the attribute includes at least one of colors and reflectance of the points,

wherein the encoding the point cloud data includes:

encoding the geometry;

encoding the attribute based on ~~complete or~~ a partial octree of the ~~encoded~~ geometry,

wherein the attribute is encoded based on a weight related to an LOD, Level of Detail, of one or more LODs, wherein the weight is derived based on a number of the points in the LODs and a number of points in the LOD, the points in the LOD include points from a first LOD to the LOD; and

transmitting a bitstream including the encoded point cloud data.

2. The method of claim 1,

wherein the attribute is encoded based on a partial tree of the geometry,

wherein the encoding the attribute includes:

generating one or more LODs by ~~partitioning~~ reorganizing the points;

lifting transform coding the attribute based on the one or more LODs; and

quantization processing the transformed attribute based on the weight.

3. The method of claim 2,

wherein the weight is used to decode the encoded attribute based on the partial octree.

~~wherein the bitstream includes signaling information representing whether decoding the encoded attribute based on the partial octree is available.~~

4. The method of claim 3,

wherein the bitstream includes signaling information representing whether the encoded attribute is decoded based on the partial octree.

~~wherein the lifting transform coding the attribute based on the one or more LODs includes computing a quantization weight for each LOD,~~

~~wherein the quantization weight is determined based on the number of the points and the number of accumulated points included in to a level(l) that a corresponding LOD represents.~~

5. The method of claim 41, wherein ~~the quantization~~ weight is represented as follows:

~~$W_{extended\ LoD_l} = \frac{\text{Total point number}}{point\ number\ in\ LoD_l} = \frac{\text{Total point number}}{\sum_{i=0}^{l} point\ number\ in\ R_i}$~~

$$W_{extended\ LoD_l} = \frac{\text{Total point number}}{point\ number\ in\ LoD_l},$$

$W_{extended\ LoD_l}$ represents the weight, the total point number represents the number of the points, the point number in LoDl represents a number of points in the LODl.

~~wherein total point number represents the number of the points, point number in LoDl represents an number of accumulated points included in to a level(l) that a corresponding LOD represents, point number in Ri represents the number of points that belong to a level i of an LOD, and a value of the point number in LODl is equal to sum of value of the point number in Ri wherein value of i is in a range of 0 to 1.~~

6. A device of transmitting point cloud data, the device comprises:

an encoder configured to encode the point cloud data including geometry and attribute, wherein the geometry represents positions of points of the point cloud data, the attribute includes at least one of colors and reflectance of the points,

wherein the encoder includes:

a geometry encoder configured to encode the geometry; and

an attribute encoder configured to encode the attribute based on ~~complete or~~ a partial octree of the ~~encoded~~ geometry, wherein the attribute is encoded based on a weight related to an LOD, Level of Detail, of one or more LODs, wherein the weight is derived based on a

number of the points in the LODs and a number of points in the LOD, the points in the LOD include points from a first LOD to the LOD; and

a transmitter configured to transmit a bitstream including the encoded point cloud data.

7. The device of claim 6,

wherein the attribute is encoded based on a partial tree of the geometry,

wherein the attribute encoder configured to:

generate one or more LODs by ~~partitioning~~ reorganizing the points,

perform lifting transform coding the attribute based on the one or more LODs,

perform quantization processing the transformed attribute.

~~8. The device of claim 7,~~

~~wherein the bitstream includes signaling information representing whether decoding the encoded attribute based on the partial octree is available.~~

~~9. The device of claim 8,~~

~~wherein the attribute encoder includes computing a quantization weight for each LOD,~~

~~wherein the quantization weight is determined based on the number of the points and the number of accumulated points included in to a level(l) that a corresponding LOD represents.~~

~~10.~~8. The device of claim ~~6~~9,

wherein the ~~quantization~~ weight is represented as follows:

$$W_{extended\ LoD_l} = \frac{\text{Total point number}}{point\ number\ in\ LoD_l} = \frac{\text{Total point number}}{\sum_{i=0}^{l} point\ number\ in\ R_i}$$

$$W_{extended\ LoD_l} = \frac{\text{Total point number}}{point\ number\ in\ LoD_l}$$

$W_{extended\ LoD_l}$ represents the weight, ~~wherein~~ the total point number represents the number of the points,~~–~~ the point number in LoDl represents a~~n~~ number of ~~accumulated~~ points in the LODl. ~~included in to a level(l) that a corresponding LOD represents, point number in Ri represents the number of points that belong to a level i of an LOD, and a value of the point number in LODl is equal to sum of value of the point number in Ri wherein value of i is in a range of 0 to 1.~~

~~11.~~9. ~~–~~A method of processing point cloud data, the method comprising:

receiving a bitstream including the point cloud data, the bitstream including signaling information; and

decoding the point cloud data based on the signaling information,

wherein the decoding the point cloud data ~~further~~ includes:

decoding geometry included in the point cloud data, wherein the geometry represents positions of points of the point cloud data; and

decoding attribute, that includes at least one of colors and reflectance of the points, based on ~~complete or~~ a partial octree of the ~~decoded~~ geometry, wherein the attribute is decoded based on a weight related to an LOD, Level of Detail, of one or more LODs, wherein the weight is derived based on a number of the points in the LODs and a number of points in the LOD, the points in the LOD include points from a first LOD to the LOD.

~~12.~~10. The method of claim ~~11~~9,

wherein the signaling information ~~required for decoding the point cloud data~~ includes ~~signaling~~ scalability information representing whether lifting transform decoding ~~the~~ attribute based on the partial octree is ~~available~~allowed.

~~13.~~11. The method of claim ~~12~~10, wherein the attribute is decoded based on a partial tree of the geometry, wherein the decoding the attribute includes:

generating one or more LODs by ~~partitioning~~ reorganizing the points;

lifting transform decoding the attribute based on the one or more LODs; and

inverse quantization processing the ~~transformed~~ decoded attribute.

~~14.~~12. The method of claim ~~13~~11, wherein the weight is computed for each point in each LOD from 0^{th} LOD to the last LOD.~~wherein the lifting transform coding the attribute based on the one or more LODs includes computing a quantization weight for each LOD,~~

~~wherein the quantization weight is determined based on the number of the points and the number of accumulated points included in to a level(l) that a corresponding LOD represents.~~

~~15. The method of claim 14, wherein computing a quantization weight is performed by each point included in each LOD from 0th LOD to the last LOD, wherein the computed quantization weight is used as an input of the inverse quantization processing.~~

~~16.~~13. A device of processing point cloud data, the device comprising:

a receiver to receive a bitstream including the point cloud data, wherein the bitstream includes signaling information; and

a decoder to decode the point cloud data based on the signaling information,

wherein the decoder includes:

a geometry decoder to decode geometry included in the point cloud data, the geometry represents positions of points of the point cloud data; and

an attribute decoder to decoded attribute~~, that includes~~ including at least one of colors and reflectance of the points~~,~~ based on ~~complete or~~ a partial octree of the ~~decoded~~ geometry, wherein the attribute is decoded based on a weight related to an LOD, Level of Detail, of one or more LODs, wherein the weight is derived based on a number of the points in the LODs and a number of points in the LOD, the points in the LOD include points from a first LOD to the LOD.

~~17.~~14. The device of claim ~~16~~13,

wherein the signaling information ~~required for decoding the point cloud data~~ includes ~~signaling~~ scalability information representing whether lifting transform decoding ~~the~~ attribute based on the partial octree is ~~available~~allowed, the weight is computed for each point in each LOD from 0^{th} LOD to the last LOD.

~~18.~~15. The device of claim ~~17~~14, wherein the attribute is decoded based on a partial tree of the geometry, wherein the attribute decoder is configured to:

generate one or more LODs by ~~partitioning~~ reorganizing the points;

~~perform~~ lifting transform decode~~coding~~ the attribute based on the one or more LODs; and

~~perform~~ inverse quantization process~~ing~~ the decoded~~transformed~~ attribute.

~~19. The device of claim 18, the attribute decoder use a computed quantization weight for each LOD as an input of the inverse quantization processing,~~

~~when decoding attribute based on partial octree of the geometry is available, the quantization weight is determined based on the number of the points and the number of accumulated points included in to a level(l) that a corresponding LOD represents.~~

~~20. The device of claim 19, the quantization weight is computed by each point belongs to each LOD from 0^{th} to the last LOD.~~