

This is the format specification for Subnautica terrain patches, also known as the `optoctreepatch` format. This format is based on the Subnautica terrain data format (version 4) as specified at <https://unknownworlds.com/subnautica/terrain-data-format/>, and understanding that format is recommended before using this format.

Patch Format

File

Byte	0	1	2	3	4	5	6	7
Field	Version				Material Byte Count		Materials			Batches
Type	uint				uint		Material[]			Batch[]

Each patch file starts with a four-byte little-endian unsigned 32-bit integer, which represents the version field. The current version is 0. If the version is 4 294 967 295 (`UInt32.MaxValue`), the patch is guaranteed to be invalid. Then, there is a four-byte little-endian unsigned 32-bit integer which represents the amount of bytes that the Materials take up. Then there is an array of any number of custom Materials to be used by patches in the Octree specification. After this, the patch contains an array of any number of batches, which can be either modified batches that need to be patched or new batches that must be created.

Material

Byte	0	1	...
Field	ID		Texture
Type	ushort		JPEG

A material represents a custom block type to be used by patches, where Texture is a JPEG encoded image to be used as the texture. ID must be greater than 255.

Batch

Byte	0	1	2	3	4	5	6	...
Field	X Position		Y Position		Z Position		Octree Count	Octrees
Type	short		short		short		byte	Octree[]

Each batch starts with six bytes that represent that batch's position. Each number is a signed little-endian 16bit integer. In the game's terrain format, these fields are the three numbers in the name of the batch, e.g. `compiled-batch-12-18-12.optoctrees`. Then, there is a single unsigned byte representing the number of octrees in the batch that are being replaced or created, followed by an array of those octrees.

Octree

Byte	0	1	2	...
Field	Octree Number	Node Count		Nodes
Type	byte	ushort		Node []

Each octree starts with a single unsigned byte representing the position of this octree in the final batch, from 0 to 124. This encodes the position of the octree as specified in the game's terrain data format. This is followed by a 16-bit unsigned integer representing the number of nodes in this octree, and then the array of nodes. The last two fields are identical to the game's terrain format.

Node

Byte	0	1	2	3
Field	Material	Signed Distance		Child Index
Type	ushort	byte		ushort

Nodes themselves are almost identical to the game's terrain format, however Material is a ushort rather than a byte to allow for custom block types/materials.

Naming

Patch files must use the `.optoctreepatch` file extension. The file name should be the name of the mod that includes the terrain patch, or (if the mod contains multiple terrain patches) a short description of the contents of the patch.

Patch names should use only lowercase letters, numbers, and should use the dash symbol (-) instead of spaces. For example, `void-bottom.optoctreepatch`, or `distant-islands3.optoctreepatch` are good file names for terrain patches.

Patch files should not contain words like "terrain" or "patch", unless they're part of the mod's name, to avoid redundancy.

Example Data

The following example patch replaces the first three octrees in batch (12, 18, 12) with a single-node empty octree, replaces the last octree in batch (0, 0, 0) with a single-node octree of material 23, and creates a new batch at (-2, 19, -4) with two single-node octrees of material 1.

00	00	00	00	0C	00	12	00	0C	00	03	00	01	00	00	00
00	00	01	01	00	00	00	00	00	00	02	01	00	00	00	00
00	00	00	00	00	00	01	7C	01	00	23	00	00	00	FE	FF
13	00	FC	FF	02	23	01	00	01	00	00	00	4C	01	00	01
00	00	00	1C	00	13	00	1C	00	02	64	01	00	23	00	00
00	03	01	00	23	00	00	00								

The bytes in **blue** are the version bytes. The bytes in **red** are the batch to edit, and the **orange** bytes are the number of octrees to replace. The **yellow** bytes are the position of the octree to replace, and the **green**

bytes are the number of nodes in that octree. The white bytes are the node data, which is the same as the game's terrain format.

Explanation

The version number is 00 00 00 00.

The first batch to modify is at position 0C 00 12 00 0C 00 (12, 18, 12). This batch has 03 octrees to replace. The first octree is at position 00, and contains 01 00 node. The node data is 00 00 00 00. The other octrees are the same, except their positions are 01 and 02.

The second batch to modify is at position 00 00 00 00 00 00 (0, 0, 0). This batch has 01 octree to replace. This octree is at position 7C (124) and contains 01 00 node. The node data is 23 00 00 00.

The third batch to modify is at position FE FF 13 00 FC FF (-2, 19, -4). This batch has 02 octrees to replace. The first octree is at position 23 (35), and contains 01 00 node. The node data is 01 00 00 00. The second octree is the same, except it's at position 4C (76).

The fourth and final batch to modify is at position 1C 00 13 00 1C 00 (28, 19, 28). This batch has 02 octrees to replace. The first octree is at position 64 (100), and contains 01 00 node. The node data is 01 00 00 00. The second octree is the same, except it's at position 03.

As you can see from this example, the terrain patch format allows for creating new batches the same way you would patch an existing batch. It also allows for creating batches outside of the current world bounds, although this feature is not currently implemented by the terrain patcher.