CLAIMS

1. A method for performing high frequency reconstruction of an audio signal, the method comprising:

receiving an encoded audio bitstream, the encoded audio bitstream including audio data representing a lowband portion of the audio signal and high frequency reconstruction metadata;

decoding the audio data to generate a decoded lowband audio signal;

extracting from the encoded audio bitstream the high frequency reconstruction metadata, the high frequency reconstruction metadata including operating parameters for a high frequency reconstruction process, the operating parameters including a patching mode parameter located in a backward-compatible extension container of the encoded audio bitstream, wherein a first value of the patching mode parameter indicates spectral translation and a second value of the patching mode parameter indicates harmonic transposition by phase-vocoder frequency spreading;

filtering the decoded lowband audio signal to generate a filtered lowband audio signal;

regenerating a highband portion of the audio signal using the filtered lowband audio signal and the high frequency reconstruction metadata, wherein the regenerating includes spectral translation if the patching mode parameter is the first value and the regenerating includes harmonic transposition by phase-vocoder frequency spreading if the patching mode parameter is the second value; and

combining the filtered lowband audio signal with the regenerated highband portion to form a wideband audio signal,

wherein the filtering, regenerating, and combining are performed as a post-processing operation with a delay of 3010 samples per audio channel.

2. The method of claim 1 wherein the encoded audio bitstream further includes a fill element with an identifier indicating a start of the fill element and fill data after the identifier, wherein the fill data includes the backward-compatible extension container.

3. The method of claim 1 wherein the harmonic transposition by phase-vocoder frequency spreading is performed with an estimated complexity at or below 4.5 million of operations per second and at or below 3 kWords of memory.

4. A non-transitory computer-readable medium having instructions which, when executed by a computing device or system, cause said computing device or system to execute the method of claim 1.

5. An audio processing unit for performing high frequency reconstruction of an audio signal, the audio processing unit comprising:

an input interface for receiving an encoded audio bitstream, the encoded audio bitstream including audio data representing a lowband portion of the audio signal and high frequency reconstruction metadata;

a core audio decoder for decoding the audio data to generate a decoded lowband audio signal;

a deformatter for extracting from the encoded audio bitstream the high frequency reconstruction metadata, the high frequency reconstruction metadata including operating parameters for a high frequency reconstruction process, the operating parameters including a patching mode parameter located in a backward-compatible extension container of the encoded audio bitstream, wherein a first value of the patching mode parameter indicates spectral translation and a second value of the patching mode parameter indicates harmonic transposition by phase-vocoder frequency spreading;

an analysis filterbank for filtering the decoded lowband audio signal to generate a filtered lowband audio signal;

a high frequency regenerator for reconstructing a highband portion of the audio signal using the filtered lowband audio signal and the high frequency reconstruction metadata, wherein the reconstructing includes a spectral translation if the patching mode parameter is the first value and the reconstructing includes harmonic transposition by phase-vocoder frequency spreading if the patching mode parameter is the second value; and

a synthesis filterbank for combining the filtered lowband audio signal with the regenerated highband portion to form a wideband audio signal,

wherein the analysis filterbank, high frequency regenerator, and synthesis filterbank are performed in a post-processor with a delay of 3010 samples per audio channel, so that a composition time applies to a 3011-th audio sample within an audio composition unit.

6. The audio processing unit of claim 5 wherein the harmonic transposition by phase-vocoder frequency spreading is performed with an estimated complexity at or below 4.5 million of operations per second and at or below 3 kWords of memory.