CLAIMS

1. A method for decoding an encoded audio bitstream, the method comprising:

receiving the encoded audio bitstream, the encoded audio bitstream including audio data representing a lowband portion of an audio signal;

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

extracting from the encoded audio bitstream high frequency reconstruction metadata, the high frequency reconstruction metadata including operating parameters for a high frequency reconstruction process that linearly translates a consecutive number of subbands from a lowband portion of the audio signal to a highband portion of the audio signal;

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

extracting from the encoded audio bitstream a flag indicating whether either linear translation or harmonic transposition is to be performed on the audio data;

regenerating a highband portion of the audio signal using the filtered lowband audio signal and the high frequency reconstruction metadata in accordance with the flag; and

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

wherein the analysis filterbank includes analysis filters, $h_k(n)$, that are modulated versions of a prototype filter, $p_0(n)$, according to:

$$h_k(n) = p_0(n) \exp\left\{i\frac{\pi}{M}\left(k+\frac{1}{2}\right)\left(n-\frac{N}{2}\right)\right\}, \quad 0 \le n \le N;\ 0 \le k < M$$

where $p_0(n)$ is a real-valued symmetric or asymmetric prototype filter, M is a number of channels in the analysis filterbank and N is the prototype filter order.

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 flag.

3. The method of claim 2 wherein the identifier is a three bit unsigned integer transmitted most significant bit first and having a value of 0x6.

4. The method of claim 2, wherein the fill data includes an extension payload, the extension payload includes spectral band replication extension data, and the extension payload is identified with a four bit unsigned integer transmitted most significant bit first and having a value of ‘1101’ or ‘1110’, and, optionally,

wherein the spectral band replication extension data includes:

an optional spectral band replication header,

spectral band replication data after the header,

an spectral band replication extension element after the spectral band replication data, and wherein the flag is included in the spectral band replication extension element.

5. The method of any one of claims 1-4 wherein the high frequency reconstruction metadata includes an operating parameter selected from the group consisting of envelope scalefactors, noise floor scale factors, sinusoid addition information, time/frequency grid information, crossover frequency, and inverse filtering mode.

6. The method of any one of claims 1-4 wherein the prototype filter, $p_0(n)$, is derived from coefficients of Table 4.

7. The method of any one of claims 1-4 wherein the prototype filter, $p_0(n)$, is derived from coefficients of Table 4 by one or more mathematical operations selected from the group consisting of rounding, subsampling, interpolation, or decimation.

8. A non-transitory computer readable medium containing instructions that when executed by a processor perform the method of claim 1.

9. A decoder for decoding an encoded audio bitstream, the decoder comprising:

an input interface for receiving the encoded audio bitstream, the encoded audio bitstream including audio data representing a lowband portion of an audio signal;

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

a deformatter for extracting from the encoded audio bitstream high frequency reconstruction metadata, the high frequency reconstruction metadata including operating parameters for a high frequency reconstruction process that linearly translates a consecutive number of subbands from a lowband portion of the audio signal to a highband portion of the audio signal;

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

a deformatter for extracting from the encoded audio bitstream a flag indicating whether either linear translation or harmonic transposition is to be performed on the audio data;

a high frequency regenerator for regenerating a highband portion of the audio signal using the filtered lowband audio signal and the high frequency reconstruction metadata in accordance with the flag; and

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

wherein the analysis filterbank includes analysis filters, $h_k(n)$, that are modulated versions of a prototype filter, $p_0(n)$, according to:

$$h_k(n) = p_0(n) \exp\left\{i\frac{\pi}{M}\left(k+\frac{1}{2}\right)\left(n-\frac{N}{2}\right)\right\}, \quad 0 \le n \le N;\ 0 \le k < M$$

where $p_0(n)$ is a real-valued symmetric or asymmetric prototype filter, M is a number of channels in the analysis filterbank and N is the prototype filter order.

10. The decoder of claim 9 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 flag.

11. The decoder of claim 10 wherein the identifier is a three bit unsigned integer transmitted most significant bit first and having a value of 0x6.

12. The decoder of claim 10, wherein the fill data includes an extension payload, the extension payload includes spectral band replication extension data, and the extension payload is identified with a four bit unsigned integer transmitted most significant bit first and having a value of ‘1101’ or ‘1110’, and, optionally,

wherein the spectral band replication extension data includes:

an optional spectral band replication header,

spectral band replication data after the header,

an spectral band replication extension element after the spectral band replication data, and wherein the flag is included in the spectral band replication extension element.

13. The decoder of any one of claims 9-12 wherein wherein the high frequency reconstruction metadata includes an operating parameter selected from the group consisting of envelope scalefactors, noise floor scale factors, sinusoid addition information, time/frequency grid information, crossover frequency, and inverse filtering mode.

14. The decoder of any one of claims 9-12 wherein the prototype filter, $p_0(n)$, is derived from coefficients of Table 4.

15. The decoder of any one of claims 9-12 wherein the prototype filter, $p_0(n)$, is derived from coefficients of Table 4 by one or more mathematical operations selected from the group consisting of rounding, subsampling, interpolation, or decimation.