

CLAIMS

1. A method of encoding a frame, the method comprising:
encoding a first audio frame of an audio signal at an encoder of a first computing device;
transmitting the first audio frame from the first computing device to a second computing device;

determining, based on a frame type of the first audio frame, a first number of bits of a second audio frame to allocate to primary coding information associated with the second audio frame and a second number of bits of the second audio frame to allocate to redundant coding information associated with the first audio frame, wherein the second audio frame follows the first audio frame in the audio signal, and wherein the frame type of the first audio frame includes one or more of an all-predictive frame type, a noise-excited linear prediction frame type, a generic frame type, a no-predictive frame type, or a frame type carrying no redundant coding information;

encoding the second audio frame at the first computing device, wherein the second audio frame includes the first number of bits of primary coding information, the second number of bits of redundant coding information, and an indicator of the frame type of the first audio frame; and

transmitting the second audio frame from the first computing device to the second computing device.

2. The method of claim 1, wherein the indicator of frame type of the first audio frame is included in the last three bits of the second audio frame.

3. The method of any of claims 1 to 2, wherein the redundant coding information includes a gain shape indicator associated with a high-band gain shape of the first audio frame, and the method further comprising setting a value of the gain shape indicator based on one or more of:

a correlation between a high-band portion of the first audio frame and a high-band portion of the second audio frame, and

a distance between a first codebook index associated with the high-band gain shape of the first audio frame and a second codebook index associated with a high-band gain shape of the second audio frame.

4. The method of any of claims 1 to 3, wherein the redundant coding information includes a high-band gain frame indicator associated with a high-band gain frame of the first audio frame.

5. The method of claim 4, further comprising at least one of:
when the first audio frame is an unvoiced frame, setting the high-band gain frame indicator to a codebook index; and
when the first audio frame is not an unvoiced frame, setting the high-band gain frame indicator to a value indicating whether the high-band gain frame of the first audio frame corresponds to a codebook index in a first portion of a codebook corresponding to high codebook indexes or in a second portion of the codebook corresponding to low codebook indexes.

6. The method of any of claims 1 to 5, wherein the redundant coding information includes a high-band line spectral pair (LSP) indicator associated with high-band LSPs of the first audio frame, the method further comprising setting a value of the high-band LSP indicator based on one or more of:
a spectral distortion between the first audio frame and the second audio frame, and
a distance between a first codebook index associated with the high-band LSPs of the first audio frame and a second codebook index associated with high-band LSPs of the second audio frame.

7. The method of any of claims 1 to 6, wherein the redundant coding information includes a high-band line spectral pair (LSP) indicator associated with high-band LSPs of the first audio frame, the method further comprising:
determining a difference between the high-band LSPs of the first audio frame and high-band LSPs of the second audio frame; and
setting a value of the high-band LSP indicator based on the difference.

8. An apparatus comprising:
an encoder configured to:
encode a first audio frame of an audio signal;
determine, based on a frame type of the first audio frame, a first number of bits of a second audio frame to allocate to primary coding information associated with the

second audio frame and a second number of bits of the second audio frame to allocate to redundant coding information associated with the first audio frame, wherein the second audio frame follows the first audio frame in the audio signal, and wherein the frame type of the first audio frame includes one or more of an all-predictive frame type, a noise-excited linear prediction frame type, a generic frame type, a no-predictive frame type, or a frame type carrying no redundant coding information; and

encode the second audio frame, wherein the second audio frame includes the first number of bits of primary coding information, the second number of bits of redundant coding information, and an indicator of the frame type of the first audio frame; and

a transmitter configured to transmit the first audio frame and the second audio frame to a destination device.

9. The apparatus of claim 8, wherein the encoder comprises a primary encoding path.

10. The apparatus of claim 9, wherein the first number of bits of primary coding information are generated by the primary encoding path.

11. The apparatus of any of claims 8 to 10, wherein the encoder further comprises a redundant encoding path that operates in parallel with the primary encoding path, wherein the second number of bits of redundant coding information are generated by the redundant encoding path, wherein the primary encoding path is configured to provide low-band parameters and high-band parameters to the redundant encoding path, and wherein the redundant encoding path is configured to provide an indication of the second number of bits to the primary encoding path.

12. The apparatus of any of claims 8 to 11, wherein the indicator of frame type of the first audio frame is included in the last three bits of the second audio frame.

13. The apparatus of any of claims 8 to 12, wherein the redundant coding information includes a gain shape indicator associated with a high-band gain shape of the first audio frame, and the apparatus is further configured to set a value of the gain shape indicator based on one or more of:

a correlation between a high-band portion of the first audio frame and a high-band portion of the second audio frame, and

a distance between a first codebook index associated with the high-band gain shape of the first audio frame and a second codebook index associated with a high-band gain shape of the second audio frame.

14. The apparatus of any of claims 8 to 13, wherein the redundant coding information includes a high-band gain frame indicator associated with a high-band gain frame of the first audio frame.

15. A computer-readable storage medium having instructions stored thereon that, when executed by a computer, cause the computer to carry out a method according to any of claims 1 to 7.