Claims

1. Apparatus for generating an error concealment signal, comprising:

an LPC (linear prediction coding) representation generator ~~(100)~~ for generating a first replacement LPC representation and a different second replacement LPC representation;

an LPC synthesizer ~~(106)~~ for filtering a first codebook information using the first replacement representation to obtain a first replacement signal and for filtering a different second codebook information using the second replacement LPC representation to obtain a second replacement signal; and

a replacement signal combiner ~~(110)~~ for combining the first replacement signal and the second replacement signal by summing-up the first replacement signal and the second replacement signal to obtain the error concealment signal ~~(111)~~.

2. Apparatus of claim 1, further comprising:

an adaptive codebook ~~(102)~~ for providing the first codebook information; and

a fixed codebook ~~(104)~~ for providing the second codebook information.

3. Apparatus of claim 2,

wherein the fixed codebook ~~(104)~~ is configured to provide a noise signal ~~(112)~~ for the error concealment, and

wherein the adaptive codebook ~~(102)~~ is configured for providing an adaptive codebook content or an adaptive codebook content combined with an earlier fixed codebook content.

4. Apparatus of one of the preceding claims,

wherein the LPC representation generator ~~(100)~~ is configured to generate the first replacement LPC representation using one or more non-erroneous preceding LPC representations, and

to generate the second replacement LPC representation using a noise estimate and at least one non-erroneous preceding LPC representation.

5. Apparatus of claim 4,

wherein the LPC representation generator ~~(100)~~ is configured to generate the first replacement LPC representation using a mean value of at least two last good frames ~~(130)~~ and a weighted summation of the mean value and the last good frame ~~(136)~~, wherein a first weighting factor of the weighted summation changes over successive erroneous or lost frames,

wherein the LPC coefficient generator is configured to generate the second replacement LPC representation only using a weighted summation ~~(146)~~ of a last good frame ~~(114)~~ and the noise estimate ~~(140)~~, wherein a second weighting factor of the weighted summation changes over successive erroneous or lost frames.

6. Apparatus of claim 4 or 5, further comprising:

a noise estimator ~~(206)~~ for estimating the noise estimate from one or more preceding good frames ~~(208)~~.

7. Apparatus of one of the preceding claims,

further comprising an LPC memory initializer ~~(320)~~ for initializing, in case of an error concealment situation ~~(210)~~, first memory states ~~(304)~~ of a first LPC synthesis filter ~~(106)~~ and second memory states ~~(308)~~ of a second LPC synthesis filter ~~(108)~~ using filter states stored in corresponding memory states of a single LPC synthesis filter used for a good frame preceding an erroneous or lost frame.

8. ~~-~~Apparatus of one of the preceding claims, further comprising an LPC memory initializer for initializing a single LPC filter in case of a recovery from an erroneous or lost frame to a good frame, the LPC memory initializer being configured for:

feeding at least a portion of a combined first codebook information and second codebook information or at least a portion of a combined weighted first codebook information and a weighted second codebook information into an LPC filter ~~(418)~~,

saving memory states obtained by the feeding; and

initializing the single LPC filter using the saved memory states, when a subsequent frame is a good frame.

9. Apparatus of one of the preceding claims,

further comprising a controller ~~(409)~~ for controlling a feedback into a first codebook ~~(102)~~ providing the first codebook information, wherein the controller ~~(409)~~ is configured to feed the first codebook information back into the first codebook or to feed the combination of the first codebook information and the second codebook information back into the first codebook.

10. Apparatus of one of the preceding claims, further comprising:

a gain calculator ~~(600)~~ for calculating a first gain information from the first replacement LPC representation, and for calculating a second gain information from the second replacement LPC representation;

a compensator ~~(406, 408)~~ for compensating a gain influence of the first replacement LPC information using the first gain information and for compensating a gain influence of the second replacement LPC representation using the second gain information.

11. Apparatus of claim 10,

wherein the gain calculator ~~(600)~~ is configured to calculate:

a last good power information ~~(700)~~ related to a last good LPC representation before a start of the error concealment, a first power information ~~(702)~~ from the first replacement LPC representation and a second power information from the second replacement LPC representation,

a first gain value ~~(704)~~ using the last good power information and the first power information and a second gain value using the last good power information and the second power information, and

wherein the compensator ~~(406, 408)~~ is configured for compensating using the first gain value and using the second gain value ~~(706)~~.

12. Apparatus of claim 10,

wherein the gain calculator ~~(600)~~ is configured to calculate an impulse response ~~(716)~~ of an LPC representation and to calculate an RMS value ~~(718)~~ from the impulse response to obtain a corresponding power information.

13. Apparatus of one of the preceding claims,

wherein the LPC representation generator is configured to generate ISF vectors for the replacement LPC representations.

14. Apparatus of claim 1, wherein the replacement signal combiner ~~(110)~~ is configured to perform a synchronized sample-by-sample addition, or a weighted sample-by-sample addition of the first replacement signal and the second replacement signal to obtain the error concealment signal ~~(111)~~.

15. A method of generating an error concealment signal, comprising:

generating ~~(100)~~ a first replacement LPC representation and a different second replacement LPC representation;

filtering ~~(106)~~ a first codebook information using the first replacement representation to obtain a first replacement signal and filtering ~~(108)~~ a different second codebook information using the second replacement LPC representation to obtain a second replacement signal; and

combining ~~(110)~~ the first replacement signal and the second replacement signal by summing-up the first replacement signal and the second replacement signal to obtain the error concealment signal ~~(111)~~.

16. Computer program for performing, when running on a computer or a processor, the method for generating an error concealment signal of claim 15.