CLAIMS

1. A method for frame loss concealment, the method being performed by a receiving entity (103, 200, 400, 800, 900), comprising:

performing sinusoidal analysis of at least a part of a previously received or reconstructed audio or speech signal in response to detecting a frame loss;

constructing a substitution frame for a lost frame based on said sinusoidal analysis;

adding (S104, S208), in association with constructing the substitution frame for the lost frame and in response to determining that a burst error length exceeds a first threshold T1, a noise component to the substitution frame,

wherein the noise component has a frequency characteristic corresponding to a low-resolution spectral representation of an audio or speech signal in a previously received frame.

2. The method according to claim 1, wherein the noise component and the substitution frame are scaled with scale factors being dependent on the number of consecutively lost frames such that the noise component is gradually superimposed on the substitution frame with increasing magnitude as a function of said number of consecutively lost frames.

3. The method according to claim 1 or 2, wherein the substitution frame spectrum and the noise component are superimposed in frequency domain.

4. The method according to any of the preceding claims, wherein the low-resolution spectral representation is based on a magnitude spectrum of said audio or speech signal in said previously received frame.

5. The method according to claim 4, further comprising:

obtaining (S202a) said low-resolution representation of said magnitude spectrum by frequency-group-wise averaging said magnitude spectrum of said audio or speech signal in said previously received frame.

6. The method according to claim 4, further comprising:

obtaining (S202b) said low-resolution representation of said magnitude spectrum by frequency-group-wise averaging a multitude n of low-resolution

frequency domain transforms of said audio or speech signal in said previously received frame.

7. The method according to claim 5 or 6, wherein group widths used during said frequency-group-wise averaging follow human auditory critical bands.

8. The method according to any of the preceding claims, wherein the low-resolution spectral representation is based on a set of linear predictive coding, LPC, parameters.

9. The method according to any of the preceding claims, wherein the adding of the noise component to the substitution frame is performed in frequency domain.

10. The method according to any of claims 1 to 8, wherein the adding of the noise component to the substitution frame is performed in time domain.

11. The method according to any of claims 3 to 9, wherein the substitution frame is gradually attenuated by an attenuation factor $\alpha(m)$.

12. The method according to claim 11, wherein the substitution frame has a phase and wherein said phase is superimposed with a random phase value $\vartheta(m)$.

13. The method according to claim 11 or 12, further comprising:

determining (S204) a magnitude scaling factor $\beta(m)$ for the noise component such that $\beta(m)$ compensates for energy loss resulting from applying the attenuation factor $\alpha(m)$ to the substitution frame .

14. The method according to claim 13, wherein the noise component is provided with a random phase value $\eta(m)$.

15. The method according to any one of claims 12 to 14, wherein $\beta(m)$ is determined as

$$\beta(m) = \sqrt{1 - \alpha^2(m)}.$$

16. The method according to claim 12 or 14, wherein $\beta(m)$ is determined as $(m) = \lambda(m) \cdot \sqrt{1 - \alpha^2(m)}$, where $\lambda(m)$ is a frequency dependent attenuation factor.

17. The method according to claim 16, wherein $\lambda(m)$ is equal 1 for m below a threshold and $\lambda(m)$ is less than 1 for m above said threshold.

18. The method according to any of the preceding claims, wherein a low-pass characteristic is imposed on said low-resolution spectral representation.

19. The method according to any of claims 13 to 18, wherein the scaling factors $\alpha(m)$ and $\beta(m)$ are frequency-group-wise constant.

20. The method according to claim 1 wherein T1≥2.

21. The method according to claim 20, further comprising:

applying (S103, S206) a long-term attenuation factor γ to $\beta(m)$ when said burst error length n exceeds a second threshold T2 at least as large as said first threshold.

22. The method according to claim 21, wherein T2≥10.

23. The method according to any of the preceding claims, wherein the substitution frame component is derived by a primary frame loss concealment method.

24. The method according to claim 24, wherein the primary frame loss concealment method is Phase ECU.

25. A receiving entity (103, 200, 400, 800, 900) for frame loss concealment, the receiving entity comprising processing circuitry (803), the processing circuitry being configured to cause the receiving entity to perform a set of operations comprising:

performing sinusoidal analysis of at least a part of a previously received or reconstructed audio or speech signal in response to detecting a frame loss;

constructing a substitution frame for a lost frame based on said sinusoidal analysis

adding, in association with constructing the substitution frame for the lost frame and in response to determining that a burst error length exceeds a first threshold T1, a noise component to the substitution frame,

wherein the noise component has a frequency characteristic corresponding to a low-resolution spectral representation of an audio or speech signal in a previously received frame.

26. The receiving entity according to claim 25, further comprising a storage medium (804) storing said set of operations, and wherein the processing circuitry is configured to retrieve said set of operations from the storage medium to cause the receiving entity to perform said set of operations.

27. The receiving entity according to claim 25 or 26, wherein said set of operations is provided as a set of executable instructions.

28. A computer program (805, 1002) for frame loss concealment, the computer program comprising computer code which, when run on processing circuitry (803) of a receiving entity (103, 200, 400, 800, 900), causes the receiving entity to:

perform sinusoidal analysis of at least a part of a previously received or reconstructed audio or speech signal in response to detecting a frame loss;

construct a substitution frame for a lost frame based on said sinusoidal analysis;

add (S104, S208), in association with constructing the substitution frame for the lost frame and in response to determining that a burst error length exceeds a first threshold T1, a noise component to the substitution frame,

wherein the noise component has a frequency characteristic corresponding to a low-resolution spectral representation of an audio or speech signal in a previously received frame.

29. A computer program product (1001) comprising a computer program (805, 1002) according to claim 28, and a computer readable means (1003) on which the computer program is stored.