METHOD OF REDUCING THE PEAK FACTOR OF A MULTICHANNEL EMISSION BY INTELLIGENT AND ADAPTIVE CLIPPING/FILTERING

The invention lies in the field of multichannel communications, and relates more particularly to a method for reducing the peak factor of a multichannel signal emitted in the high-frequency band.

HF links (the acronym standing for High-Frequency, situated between 3MHz and 30MHz) offer a non-line-of-sight communication capacity making it possible to carry out communications at long, or indeed very long distance, without requiring recourse to a satellite or to relay stations.

Hence, HF band communications use the reflection properties of the ionospheric layers for these frequencies. The drawback of the use of this band stems from the fact that, depending on the position of the ionospheric layers, propagation quality is not identical over the whole of the band. Thus, the HF band is generally divided into channels, thereby making it possible to allocate the frequency resource to various users, to afford frequency diversity to a communication, and also to adapt the use of the frequency resource to the transmission quality of the various channels, this quality varying as a function of time of day and geographical position.

Among the communication norms which use the HF band, the MIL STD 188-110C annex F standard, or the proposed STANAG 4539 annex H standard, describe the employment of several distinct 3kHz channels for communicating. The invention lies in particular within the framework of transmissions of this type, using several 3kHz channels, but also within the framework of multichannel transmissions using channels of greater width, such as for example in annex D of the MIL STD 188-110C standard, in the HF band or in other frequency bands.

The invention proposes a method for reducing the peak factor, generally designated by the name PAPR (the acronym standing for Peak-to-Average Power Ratio) of multichannel signals. This PAPR makes it possible to characterize the dynamic range of a signal, that is to say the ratio between the peak power of this signal and its average power. This type of method for

CLAIMS

1. A method for reducing the peak factor of a signal transmitted in a frequency band comprising several channels, the signal using a plurality of channels in the band, comprising:

a step of clipping the said signal,

a step of subtracting the said clipped signal from the said signal, so as to obtain a peak signal,

a step of filtering the said peak signal with the aid of a multichannel filter configured to comply with a predetermined spectral mask for each of the channels used by the signal, and

a step of subtracting the filtered peak signal from the signal.

2. The method for reducing the peak factor of a signal transmitted in a frequency band comprising several channels according to claim 1, wherein the spectral mask of the said multichannel filter is predetermined for each of the channels as a function of a maximum admissible power level in sub-bands of this channel and of its adjacent channels.

3. The method for reducing the peak factor of a signal transmitted in a frequency band comprising several channels according to claim 1, wherein at least one channel of the said frequency band is not used by the signal.

4. The method for reducing the peak factor of a signal transmitted in a frequency band comprising several channels according to claim 2, wherein the said multichannel filter is furthermore adapted so as not to reject at least one channel, not used by the said signal, of the frequency band.

5. The method for reducing the peak factor of a signal in a frequency band comprising several channels according to claim 4, wherein the at least one channel not rejected by the multichannel filter is selected from among the channels of the frequency band, not used by the said signal, having the lowest signal-to-noise ratio.

6. The method for reducing the peak factor of a signal transmitted in a frequency band comprising several channels according to claim 1, wherein the step of clipping the signal is a deep clipping.

7. The method for reducing the peak factor of a signal transmitted in a frequency band comprising several channels according to claim 1, wherein the said steps of clipping the signal, of obtaining a peak signal, of filtering the peak signal, and of subtracting the filtered peak signal from the signal are carried out iteratively.

8. The method for reducing the peak factor of a signal transmitted in a frequency band comprising several channels according to claim 1, wherein the said step of filtering the signal of peaks uses a multichannel filter embodied on the basis of a prototype filter associated with a spectral mask, the said multichannel filter being obtained by the summation of the said prototype filter shifted in frequency for each of the channels.

9. The method for reducing the peak factor of a signal in a frequency band comprising several channels according to claim 1, wherein the steps are carried out on a baseband digital signal, at modem output.

10. A device for emitting a signal in a frequency band comprising several channels, the said signal using a plurality of channels in the band, comprising:

a module for clipping the signal,

a module for calculating a peak signal by subtracting a clipped signal from the said signal,

a module for filtering a peak signal with the aid of a multichannel filter configured to comply with a predetermined spectral mask for each of the channels used by the said signal,

a module for subtracting a filtered peak signal from the said signal.

11. The device for emitting a signal in a frequency band comprising several channels according to claim 10, wherein the said signal is transmitted in the High-Frequency band.