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Appl. No. 09/673,271
Amdt. Dated June 4, 2004
Reply to Office Action of March 5, 2004

PATENT

40999

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	:
	:
Ernst Eberlein et al.	: Group Art Unit: 2631
	:
Serial No.: 09/673,271	: Examiner: Bayard, Emmanuel
	:
Filed: November 29, 2000	:
	:
For: FRAME STRUCTURE AND FRAME	:
SYNCHRONIZATION FOR MULTICARRIER :	:
SYSTEMS	:

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JUN 08 2004

Technology Center 2600

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated March 5, 2004, please amend the above-identified application as follows:

Amendments to the claims commence on page 2 herein; and

Remarks commence on page 14 herein.

AMENDMENTS TO THE CLAIMS:

This listing of the claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

47. (Currently Amended) A method for generating a signal having a frame structure, each frame of said frame structure comprising at least one useful symbol, a guard interval associated to said at least one useful symbol and a reference symbol, said method comprising the step of

performing an amplitude modulation of a bit sequence, the envelope of the amplitude modulated bit sequence defining the reference pattern of said reference symbol; and

inserting, in the time domain, the amplitude modulated bit sequence into said signal as said reference symbol.

48. (Original) The method according to claim 47, wherein said signal is an orthogonal frequency division multiplexed signal.

49. (Original) The method according to claim 47, wherein said amplitude modulation is performed such that a mean amplitude of said reference symbol substantially corresponds to a mean amplitude of the remaining signal.

50. (Currently Amended) A method for generating a multi-carrier modulated signal having a frame structure, each frame of said frame structure comprising at least one useful symbol, a guard interval associated to said at least one useful symbol and a reference symbol, said method comprising the steps of:

providing a bitstream;

mapping bits of said bitstream to carriers in order to provide a sequence of spectra;

performing an inverse Fourier transform in order to provide multi-carrier modulated symbols;

associating a guard interval to each multi-carrier modulated symbol;

generating said reference symbol by performing an amplitude modulation of a bit sequence, the envelope of the amplitude modulated bit sequence defining the reference pattern of said reference symbol;

associating said reference symbol to a predetermined number of multi-carrier modulated symbols and associated guard intervals in order to define said frame; and

inserting, in the time domain, said amplitude modulated bit sequence into said signal as said reference symbol.

51. (Original) The method according to claim 50, wherein said multi-carrier modulated signal is an orthogonal frequency division multiplex signal.
52. (Original) The method according to claim 50, wherein said amplitude modulation is performed such that a mean amplitude of said reference symbol substantially corresponds to a mean amplitude of the remaining multi-carrier modulated signal.
53. (Original) The method according to claim 47, wherein said bit sequence is a pseudo random bit sequence having good autocorrelation characteristics.
54. (Original) The method according to claim 47, wherein a number of useful

symbols in each frame is defined depending on channel properties of a channel through which the signal or the multi-carrier modulated signal is transmitted.

55. (Currently Amended) A method for frame synchronization of a signal having a frame structure, each frame of said frame structure comprising at least one useful symbol, a guard interval associated with said at least one useful symbol and a reference symbol, said reference symbol comprising an amplitude modulated bit sequence, said method comprising the steps of:

receiving said signal;

down-converting said received signal;

in the time domain, performing an amplitude-demodulation of said down-converted signal in order to generate an envelope;

in the time domain, correlating said envelope with a predetermined reference pattern in order to detect the signal reference pattern of said reference symbol in said signal; and

performing said frame synchronization based on the detection of said signal reference pattern.

56. (Original) The method according to claim 55, further comprising the step of performing a fast automatic gain control of said received down-converted signal prior to the step of performing said amplitude-demodulation.
57. (Original) The method according to claim 55, wherein the step of performing said amplitude-demodulation comprises the step of calculating an amplitude of said signal using the $\alpha_{\max} + \beta_{\min}$ method.

58. (Original) The method according to claim 55, further comprising the steps of sampling respective amplitudes of said received down-converted signal and comparing said sampled amplitudes with a predetermined threshold in order to generate a bit sequence in order to perform said amplitude demodulation.

59. (Original) The method according to claim 58, wherein the step of sampling respective amplitudes of said received down-converted signal further comprises the step of performing an over-sampling of said received down-converted signal.

60. (Original) The method according to claim 55, further comprising the step of applying a result of the frame synchronization for a frame in said signal to at least one subsequent frame in said signal.

61. (Currently Amended) A method for frame synchronization of a multi-carrier modulated signal having frame structure, each frame of said frame structure comprising at least one useful symbol, a guard interval associated to said at least one useful symbol and a reference symbol, said reference symbol comprising an amplitude modulated bit sequence, said method comprising the steps of:

receiving said multi-carrier modulated signal;

down-converting said received multi-carrier modulated signal;

in the time domain, performing an amplitude-demodulation of said down-converted multi-carrier modulated signal in order to generate an envelope;

in the time domain, correlating said envelope with a predetermined reference pattern in order to detect the signal reference pattern of said reference symbol in said multi-carrier modulated signal;

performing said frame synchronization based on the detection of said signal

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