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TIME COMPRESSION OF COMMUNICATION CHANNELS BASED ON SUPER-RAYLEIGH RESOLUTION OF SIGNALS WITH ADDITIONAL GATING OF ADC SAMPLES

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Several computational procedures are suggested permitting to carry out time compression of narrow-band communication channels based on additional gating of ADC samples. The procedures can be realized in communication systems with digital antenna arrays.

Improvement of traffic capacity of narrow-band communication lines with time compression of channels can be achieved [1] based on the methods of super-Rayleigh resolution of pulse signals in their times of arrival. We can increase many-fold the traffic volumes by using information packets, each representing a totality of pulses, one following after another with mutual overlap. However, if the speed of analog-to-digital conversion is high enough, realization of such processing in real time presents considerable difficulties because of large volumes of the data obtained. Taking into account that a decrease in the sampling frequency (to rarify the information flow) is attended with a loss of energy, the purpose of this paper is elaboration of methods of super-Rayleigh compression of channels based on procedures of additional gating of ADC samplings [2].

In essence, the suggested approach is a further extension of the method of *M*-ary amplitude-pulse modulation (*M*-PAM), when the coding of messages is performed by means of putting the intervals of partition of pulse amplitudes into one-to-one correspondence with the symbols of the *M*-ary alphabet [1].

The additional gating of ADC samples is carried out in the receiver in respect to the received signals, and consists in their periodic accumulation (*T* elementary samples, or readings, in a group) during strictly set time intervals (called strobes), permitting to reduce the dimension of the information sample by *T* times. In the case of video pulses, the respective processing can be represented in the form

$$U_g = \sum_{s=1}^{T} U_s \qquad (1)$$

where U_s is the signal voltage in the *s*th reading of ADC; *T* is duration of the accumulated sample of the readings; and *g* is the ordinal number of the strobe.

Since the information-bearing parameter, in the event of amplitude-pulse modulation, represents the amplitude of each of the signals, consider the methods of calculation of the respective amplitude estimates by an example of a discrete function of pulse envelope $P_g(z_m)$, obtained after implementing the procedure of additional gating of ADC samples taken from the primary envelope:

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