

# Correction of Clock Jitter in Analog-Digital Equipment of Telecommunication System

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**Annotation** - Clock signal impact on ADC characteristics in ADE-modules of telecommunication systems of transmission is being investigated. Qualitative characteristics and analytical dependences are obtained. Phase instability of clock signal (PICS) is accepted as the generalized characteristic which evaluates the quality of clock signal of ADC and noises impact. Jitter value of clock signal is used for quantitative characteristic of PICS.

**Keywords** - phase noise power, clock signal jitter.

## I. INTRODUCTION

Digital methods of telecommunication have advantages conditioned by new telecommunication technologies. However, digital methods of telecommunication have caused some problems which arise during signal digitization and recovery. One of these problems is the problem of clock pulses synchronization of ADE in telecommunication systems. Jitter [1] is the key parameter which characterizes the signal of clock pulses synchronization in ADE-modules. All kinds of noise and disturbance as well as instability of operation threshold of logical units are the reasons of jitter appearance. Jitter evaluation gives opportunity to determine reasons of jitter appearance and to take some measures as for minimization of jitter influence on performance of telecommunication system.

So, there is the necessity in the methodology of jitter evaluation of clock signal in ADE-module. The method of jitter evaluation would provide high accuracy and optimal value of signal-to-noise ratio in ADE-module in given band of operating frequency.

The aim of research paper is jitter evaluation of clock signals in ADE-modules of telecommunication systems. This creates favourable conditions for communication quality enhancement in digital systems of information transmission. To achieve the given goal some tasks must be solved. They are:

- to perform selection and validating of principal criterions of jitter evaluation of clock signals in ADE-module of telecommunication systems;
- to suggest method of jitter evaluation of clock signals in ADE-module of telecommunication systems;
- to carry out optimization of clock pulse generator in ADE-module of telecommunication systems.

## II. INFLUENCE ANALYSIS OF PHASE INSTABILITY OF CLOCK SIGNAL ON ADC CHARACTERISTICS OF ADE-MODULE

Jitter of clock pulses in ADE-module of telecommunication system is the keyword parameter which determines ADE separating power in ADE-module of telecommunication system. So, jitter analysis of clock signals in ADE-module should be carried out including ADC capacity and input signal frequency quantity [3].

The following factors have influence on PICS formation:

- phase noise and parasitic spectral components of clock signal generator;
- self-jitter of formation and conversion channel of clock generator signal;
- external electromagnetic interferences.

The growth of clock frequency will enforce the use of frequency demultiplier in order to gain required clock signal. According to expression 1, accumulated jitter will be equal to:

$$\varepsilon_{\Sigma} = \sqrt{(\varepsilon_1^2 + \varepsilon_2^2 + \dots + \varepsilon_N^2)} \quad (1)$$

where  $\varepsilon_1, \varepsilon_2, \dots, \varepsilon_N$  - jitter value when using frequency demultiplier.

In case of noised clock supply, the present approach demands use of additional narrowband filter.

## III. CONCLUSION

The decrease of clock signal jitter of ADC in ADE-module of telecommunication system is realized by the improvement of signal source quality, use of narrowband quartz filters and frequency demultipliers as well as by the choice of optimal structure of transmission system.

The expressions for quantitative assessment of clock signals jitter and optimized scheme of minimization of clock signal jitter of ADC in ADE-module of telecommunication system are derived in the process of the research.

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