Experimental checking of forming random numeral sequence by using meteor burst channel

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Annotation – **A possibility of forming random numeral sequence by using one of the random characteristics in meteor burst channel and its experimental proofing are shown in this work.**

Key words – meteor burst channel, random sequence, time interval between meteors.

I. INTRODUCTION

Meteor burst channel (MBC) appears at unknown place and time, after invasion of some space pieces into Earth atmosphere. MBC opens a possibility of metric radio waves transferring in a distance up to 2000 km. Casual appearing and small MBC's life period make unacceptable to use it widely in the telecommunication sphere. But it can be used as a base for creating the random numeral sequences (RNS), which are identical in two different points [2, 3]. In this work the results of experimental test of this method is described.

II. RNS FORMING

MBC have some unknown characteristics: appearing moment, life time, place coordinates, signal time for going through the communication system and time interval between meteors. These characteristics can be found only by two connecting through it points. Reservedness of MBC [1] makes almost impossible data interception. This work is presented the method based on measuring time interval between meteors.

Method is concluded in time between the last and present meteor appearance. The equivalence is passed between measured time and some number which can be used as a key in two point's data exchange.

Method based on two physic factors. First, the signals are sent from two different points at the same time, which are reflected from current step, accepted also simultaneously. Second, the speed of the signal amplitude growing, while meteor is forming, is 400-500 dB/sec, it excludes ambiguity in start moment determination [1]. This allows that measured time interval in both points is identical.

The calculations shows that for the reliable results compliance in two points, frequency of discrete taking should be more than 3,6 ms. For the transformation of distribution law of received results to uniform law the following function (1) should be used on the interval from 0 up to 1800 sec.

$$f(t) = 22{,}24\left(1 - \exp\left(-0{,}05t\right)\right) \qquad (1)$$

III. EXPERIMENTAL CHECKING

The experimental data of the Meteor Automated Radiolocation Complex was used. This Complex belongs to Kharkov National University of Radioelectronics. This data is the continuous digital recording of the 5 hours radiolocation meteors observation. The information processing is allowed to get the RNS with the speed more than 30000 bit per hour.

Following analysis of random numeral sequence in randomness was made by NIST STS (NIST Statistical Test Suite) test. According to the method of statistic testing, RNS consists of bit's rows with the length up to 20000 bit and it is checked by four tests (monobit, poker, serial and line tests). In the case the random numeral sequence won't pass one of the tests, an error fact is fixed. Analysis didn't find evident appropriateness in RNS. Received results are very close to pass the test. Random numeral sequence quality can be better. The quality improvement of RNS can be reached by using the same methods with all of random sequence generators.

IV. CONCLUSIONS

Accidental interval between meteors can be used for RNS forming. Growth of method productivity may be reached in the further activity.

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