Influence of the intersymbol interference on the length of regeneration section in fots

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Abstract – **Influence of intersymbol interference value on eye diagram on duration opening and dependence of number of generators of network elements in a circuit of clock network synchronization from dispersion relative value changing is considered.**

***Keywords* – Relative dispersion, jitter, generators of network elements**.

When increasing the capacity of a transport network increases the variance, which restricts the transmission rate. When using single-mode cable SF and laser diode with distributed feedback (line width is equal to $0,01\text{nm}$ [1]) from the rate $2,5\text{Gbit/w}$ limit on rate.

Admissible values z it is possible to change in limits $0,25 \le z \le 1$ [2]. Proceeding from it, it is possible to define that relative duration of impulse (1) will change in limits $1 \le \tau \le 1,4$.

In a case when the relative dispersion value equals to unit, eye diagram opening decreases to $T_{z=1} = 0,6$ (fig. 1.)

In work [2] it has been defined that increase of relative dispersion z to 0,5 (i.e. twice in comparison with the standard value $z = 0,25$) practically does not change signal immunity during the significant moment of time. However these recommendations did not consider reduction of eye diagram on time T_z opening with increase of z, that leads to increase in phase jitter of clock frequency.

In [2] it is shown that for Gaussian response relative duration of an impulse τ it is connected with z by relation:

$$\tau = \sqrt{z^2 + 1} \qquad (1)$$

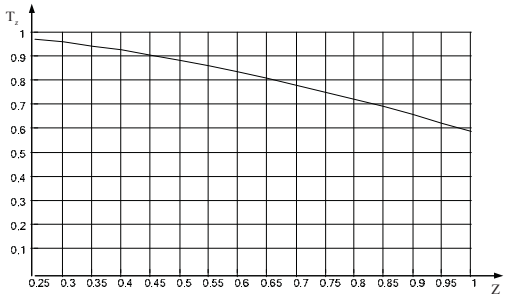

Fig. 1- Dependence T_z from Z.

There is jitter accumulation effect (clock frequency) at signal transfer on a circuit. There are standards on a maximum number of series-connected generators of network elements (GNE) in a synchronization circuit of transmission systems [3]. Consider how to change this standard, if we increase the relative dispersion.

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Cumulative in a circuit jitter $\Delta\varphi$ is proportional to $\sqrt{n} \cdot \sigma$, where n is quantity of GNE in a circuit; σ is dispersion of one GNE.

Denote the permissible number of GNE through n_1, then $\Delta\varphi \approx \sqrt{n_1} \cdot \sigma$, where, according to [3], $n_1 = 20$, $z = 0,25$. Accordingly cumulative in a circuit jitter for other values z let's write down as $\sqrt{n_2} \cdot \sigma$, where n_2 - number of GNE for the used z. From this it follows that

$$n_2 = n_1 \cdot \left(\frac{T_{z=x}}{T_{z=0,25}} \right)^2 = 20 \cdot \left(\frac{T_{z=x}}{T_{z=0,25}} \right)^2$$

The schedule of dependence of number of GNE from value z it is resulted on fig. 2.

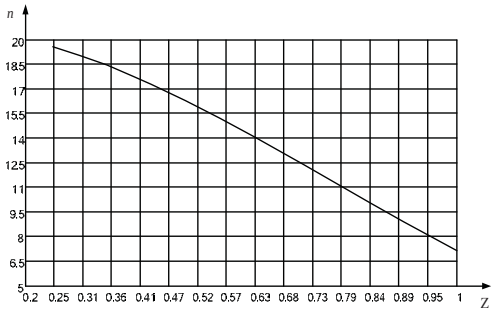

Fig. 2-Dependence of number of GNE from Z.

Based on the results we can conclude that changing the value z for the increase of length of the regeneration section, it is necessary to take into account the number of series-connected in a synchronization circuit of transmission systems generators of network elements to meet the requirements [3].

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