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 0.01nm [1]) from the rate 2.5Gbit/s limit on rate.

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

In a case when the relative dispersion value equals to unit, eye diagram opening decreases to \( \sqrt{0,25} \) (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 \( \tau \) it is connected with \( z \) by relation:

\[
\tau = \sqrt{z^2 + 1}
\]  

(1)

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

Denote the permissible number of GNE through \( n_1 \), then \( \Delta \varphi = \sqrt{n_1 \cdot \sigma} \), 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

\[
n_2 = n_1 \left( \frac{T_{z=1}}{T_{z=0,25}} \right)^2 = 20 \left( \frac{T_{z=1}}{T_{z=0,25}} \right)^2
\]

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

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].

REFERENCES

