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INVESTIGATION OF ERROR-FREE TRANSMISSION FOR HIGH DENSITY COMBINED WDM SYSTEMS

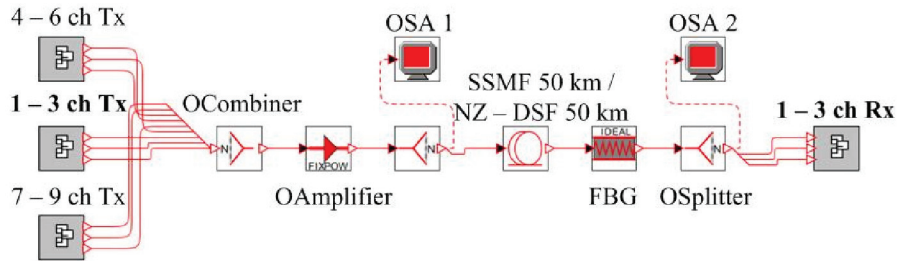
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The authors have investigated the most optimal configuration of high density combined wavelength division multiplexing (HDWDM) system. Generally our investigated combined WDM system model is offered as an optical network for future Internet design and this transmission system model can be also considered under the concept of next generation optical network (NGON). As well as, cannot be excluded that such optical signal transmission mode can be topical in case of different telecom operator networks convergence. These will result as a necessity to transmit over single optical fiber signals with different modulation formats and / or different bit rates.

This research is based on OptSim 5.2. simulation software. It numerically solves nonlinear Schrödinger equation using split step Fourier method. It is assumed that combined system's solution can be implemented maintaining previously used channel spacing values. In WDM system with 10 Gbit/s per channel bit rate combined transmission features become considerably evident, if less than 50 GHz channel spacing is used for channels separation. For such channel spacing values obtained BER value for detected signals in combined WDM system depends not only from modulation format, which is used of optical signal modulation in given channel, but also from modulation formats, which are used in adjacent channels.



For optical signal modulation in studied nine-channel HDWDM system three different modulation formats are used. System's channels were grouped by 3. Central group, which contains the 1st - 3rd system's channels, has a following configuration: [1st: NRZ – OOK, 10 Gbit/s, 193.075 THz] – [2nd: 2 – POLSK, 10 Gbit/s, 193.100 THz] – [3rd: NRZ – DPSK, 10 Gbit/s, 193.125 THz].

Authors have revealed that NRZ – DPSK modulated optical signal is a higher interchannel crosstalk source in adjacent channels than NRZ – OOK or 2 – POLSK. It is found out the optimal NRZ – DPSK channel output power level, which provides minimal in system's channel detected signals average bit-error-rate (BER). As well as, obtained correlation diagrams, which describe channels' BER values a function from: 1) NRZ – DPSK channel output power level; 2) system's channel allotment in ITU – T recommended C-band spectral grid. In addition these results for each combined system's channel were compared with the results for combined system, where instead of standard single mode fiber (SSMF, ITU – T Rec. G.652) non-zero dispersion shifted fiber (NZ – DSF, ITU – T Rec. G.655) is used as a transmission media.

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