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## **Research of Combined Transmission for High-Speed WDM systems**

The most appropriate realization of combined WDM system configuration for differently modulated optical signals in high speed dense wavelength division multiplexing (DWDM) is studied. This combined systems models are offered as a transition stage from traditional WDM systems to HDWDM systems with a higher total transmission capacity and spectral efficiency.

As an initial point of this transition stage is considered WDM systems with spectral efficiency not larger than 0.1 bit/s/Hz. In this case NRZ – OOK is used for optical signal modulation and per channel bit rate is equal to 10 Gbit/s. HDWDM systems with a spectral efficiency not smaller than 0.40 bit/s/Hz and 40 Gbit/s per channel bit rate is considered as an endpoint of this stage. Advanced modulation formats, for example, NRZ – DPSK and / or 2 – POLSK in these systems is used, firstly, to reduce linear and nonlinear crosstalk influence to detected signal quality and, secondly, to enlarge channels' spectral efficiency.

That type of system's modernization is necessary to satisfy the demand for channel's bit rate and total system's transmission capacity, because internet traffic keeps doubling every year due to expansion and variety of new information services including data, online and broadband services, and their rapid advance. In addition, such combined transmission mode will be topical in next generation optical networks, as well as, in case of different telecom operator networks convergence. These will result as a necessity to transmit over single optical fiber signals with different bit rates and / or different modulation formats.

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