

## **Modern Photonic Communication Systems and Perspectives of Their Development**

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For today, the problem of developing new devices in the optical domain is relevant in connection with the transition to communication systems of 5G/6G standards. Fiber-optic communication systems are already transmitting information at a speed of several terabits per second. Also, there are atmospheric communication stations that transmit information at a speed of tens and hundreds of gigabits per second. Most of the elements of such systems have been developed and applied in practice. The main factor affecting the speed of these systems is the electrical or magnetic control of the photonic devices. In this regard, the development of controlled optical devices of high speed is one of the most important directions in the development of photonic communication systems. New devices should exclude the use of nonlinear optical effects and low-frequency control circuits.

The paper describes, first of all, the main directions of developing the element base in the optical domain.

Also it is considered the new controlled elements of optical communication systems developed by the authors. The ones include the all-optical switch, the smart optical antenna, the optical double-way duplex isolator, etc. The authors describe the operation principle of these devices, the mathematical models for their investigation, and determine the perspectives for their use in photonic communication systems.