

Recent progress on QAM/QNSC optical transmission

Masataka Nakazawa

Tohoku University

Abstract

Recent progress on encrypted optical fiber transmission by employing so-called quantum noise stream cypher with quadrature amplitude modulation (QAM/QNSC) will be presented. QNSC, which is a classical physical layer encryption technique that uses signal masking with quantum noise, has been attracted a lot of attention as a secure long-distance and large-capacity optical transmission scheme. In this presentation, the principle of the QAM/QNSC is first presented, in which I emphasize the importance of the basis bits attached to the original data as an encrypted key comprising of multiple different randomizations. Then, QAM/QNSC with the use of QKD is presented, where the QKD is adopted instead of classical key generation. Since the present technique has an advantage of high-capacity transmission, we show 10 Tbit/s (Pol. Mux, 165 ch. WDM with 5G baud/128 QAM) QNSC Transmission over 160 km. Then, I present 40 Gbit/s three dimensional (3D) QNSC real time transmission over 560 km by incorporating not only I and Q channel encryptions but also randomization (masking) in the time domain, which makes it further difficult to decrypt the QNSC signal. Finally, I conclude my talk.