

MIMO application to detection nonreflecting events on reflectograms of optical fibers of cable lines

E.S. Zaitseva^{1,*}, A.V. Bourdine^{1,2,3}, V.A. Burdin¹

¹*Povozhskiy State University of Telecommunications and Informatics*

²*JSC "Scientific Production Association State Optical Institute Named after Vavilov S.I."*

³*LLC «LinkIn Tech»*

*E-mail: zaytzewa@inbox.ru

One of the problems with processing the optical fiber traces of cable line sections is the detection of nonreflecting events – fusion splices, irregularities, associated with optical cable bends [1 - 6]. The task of searching for such events on traces arises in the case of restoring the line documentation, detecting unauthorized access, fiber bending in a cable with an unacceptably small radius. Some methods are known for detecting and localizing nonreflecting irregularities of optical fibers in a cable [1 - 2, 7 - 14]. In particular, the application of the methods of the wavelet analysis for these purposes is considered [7, 12 - 13]. On the one hand, the application of these methods requires the usage of special equipment, and, on the other hand, their capabilities are limited by some threshold values of the signal/noise ratio. It is possible to significantly increase the probability and accuracy of target detection with a significant decrease in signal/noise ratio due to the use of MIMO (Multiple Input, Multiple Output) technology in radar systems [15 - 17]. This technique involves transmitting space-divided probing signals, receiving backscattering signals and co-processing received signals. Application of MIMO technology for detecting and localizing nonreflecting events in optical fibers of cable line of fiber optic link segment offered in paper [14].

Events, displayed on optical fiber traces in one place of the cable line (fusion splices in optical closure, additional losses due to the cable bending), are of the same nature, differing only in the degree of variation in the backscattering characteristic of the fiber. This suggests that co-processing of backscattering characteristics of optical fiber group of cable line will increase the probability of detecting nonreflecting events. This raises the question of the effectiveness of using MIMO technology to searching and detecting nonreflecting events on traces of optical fiber group of cable line.

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