

Your new questions on coding

Question 25. What for such unusual system of channels with non-equal channel energies (NEC) is thought up? Though the code gain (CG) (as it follows from the monograph and articles on MTD about these channels) grows, is here any practical sense?

The answer. All methods of modulation and other algorithms, approaches and systems which are applied together with MTD algorithms, we try to realize maximum simple and convenient for practical applications. Methods NEC can in addition successfully and very simply improve efficiency of coding, as those publications show which are mentioned in a question. Really, all usually discussed methods of modulation and coding at all do not take into account a various role of information and check code symbols in maintenance of high reliability of coding at systematic codes usage. And we have decided to look, whether it is possible to take it into account and provide the further improvement of MTD characteristics if to take into account features of coding with the help of this algorithm.

And it is valid, appeared, that due to energy redistribution between information and check code symbols it is possible to lower in addition appreciably error propagation effect when MTD algorithms is used, i.e. to reduce influence of the main effect which worsens conditions of convergence of MTD decisions to optimum decoder result. Then MTD will successfully work at higher noise level in comparison with usual coding. And thus procedure of redistribution of energy appears very simple at least in some cases. For example, for a code with $R=1/2$ it is possible to take usual system of modulation PM4 and to place signal points so that they were not in corners of the square inscribed in an unit circle, but would be in rectangular corners inscribed in this circle. Its relative sizes of the sides determine a degree of energy redistribution between information and check code symbols. As all question will consist only in coordinating a concrete kind of a signal rectangular and MTD opportunities we can receive that simple reasonable general joint adjustment of the modem and a code allows elementary ways to lower a signal level approximately at 1 dB while characteristic improvement of the decoder even at a pair of the tenth parts of decibel usually appears an extremely difficult problem.

Thus NEC application for MTD appears the next repeatedly used method successful and, that is especially important, extremely simple improvement of decoder characteristics on the basis of accurate code and decoder operating conditions consideration in the noisy channel.

The discussed NEC formation example is not unique. A number of publications on this subjects can be found also on our a web-site.