

# Optimization of Speech Codecs on set of Indicators of Quality

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**Abstract** - In article theoretical and practical features of application of methods multicriteria optimisation for a choice of optimum speech codecs taking into account set of indicators of quality are considered.

**Keywords** - Optimisation, indicators of quality, the speech codec, IP-telephony.

## I. INTRODUCTION

At creation of networks of an IP-telephony there is a necessity of a choice of speech codecs, optimum taking into account set of indicators of quality [1]. Technical and economic indicators of codecs are connected among themselves and antagonistic. Therefore there is a necessity of application of methods multicriteria optimization.

The formal decision of a problem **multicriteria** optimisation which is reduced to a finding of a subset of Pareto-optimum variants of codecs is considered [2,3]. At the optimisation final stage scalar criterion function is constructed and narrowing of this subset to a unique design variant is executed.

## II. CHOICE OF A SUBSET OF PARETO-OPTIMUM VARIANTS OF CODECS

The compromise of the entered criterion functions, that is the optimum of the entered indicators of quality co-ordinated by criterion of Pareto is thus reached. To the co-ordinated optimum there corresponds set of Pareto-optimum estimations to which there correspond variants of a network not dominated by criterion of Pareto [2]

$$P(V) = \text{opt}_{\bar{z}} V = (V^o \in R^m \mid \forall \bar{v} = \bar{k}(\phi) \in V : \bar{k}(\phi) \geq \bar{k}(\phi^o)) \quad (1)$$

Potentially achievable values of indicators the qualities corresponding to an optimum by criterion of Pareto, represent multidimensional potential characteristics of a network.

In criteria space set of Pareto-optimum estimations forms the Pareto-optimum surface and the multidimensional diagrammes of an exchange of indicators of quality of codecs connected with it.

## III. NARROWING OF SUBSET OF PARETO TO A UNIQUE VARIANT

For the subsequent design stages the unique variant of the codec is chosen. Narrowing of subset of Pareto with attraction of the additional information is thus executed. Such information is received as a result of the all-round analysis of Pareto-optimum variants of codecs, their multidimensional diagrammes of an exchange of indicators of quality, relative importance of the entered indicators of quality.

## IV. PRACTICAL FEATURES OF THE CHOICE OF THE OPTIMUM SPEECH CODEC

For carrying out of the comparative analysis of speech codecs and a choice of optimum variants data about 23 speech codecs are taken [1]. For their description it was used by set of 5 technical and economic indicators: speed of coding, an estimation of quality of coding of speech, complexity of realisation, the size of a shot, a total delay. Indicators of quality of speech codecs are connected among themselves and have competing character.

From initial set of admissible variants of speech codecs subset of Pareto including 23 variants of codecs is allocated.

The unique design decision got out of a condition of an extremum of the scalar criterion function constructed on the basis of the theory of dim sets.

It is received, that at the set statement of a problem by the optimum speech codec zdkztnz the codec of series G722b which has following values of indicators of quality: speed of coding - 64 kbit/with, an estimation of quality of coding of speech - 4,13 MOS, complexity of realisation - 11,95 MIPS, the size of a shot - 0,125 ms, a total delay - 31,5 ms.

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