The Model of Balanced Networks for the Design of Access Networks

Anton Bondarenko

Annotation – **In article an analysis of the possibility of using the balanced networks for the design of access networks is provided.**
Keywords – **Access Network (AN), Access Node, the model of balanced networks (MBN).**

I. INTRODUCTION

As the concept of AN is a relatively new, methods of its synthesis are still being developed [1]. The teachers and post-graduate students of Odesa State Academy of Refrigeration ICT department under the direction of Dr.Sci.Tech., prof. G.S. Gayvoronska have been investigating these methods since 2002. Bibliography of publications on this topic has more than 20 works. Certain aspects of the problem devoted to the development of design methods of AN were examined in theses of A.I. Kotova and S.V. Sahorova. The synthesis of topological structure of AN and an optimization of routing algorithms of AN are another unexplored aspects of AN concept. The usage of the MBN is a possible approach to solve these tasks. It was invented by prof. V.P. Gladun from V.M. Glushkov Institute of Cybernetics of NAS of Ukraine.

Therefore the work on analyzing the possibility of usage the MBN in designing of AN is performed under the agreement on scientific and technical cooperation between this institute and Odesa State Academy of Refrigeration. A main purpose of the the work is to increase the efficiency of AN and to reduce design time by using the MBN. This paper is devoted to solve this problem.

II. MAIN PART

During the research an algorithm of the common model of synthesis of AN structure was developed and the software simulation model of creation process of AN was realized. But this model has some fundamental defects, which means that it needs to be improved. Thereby the heuristic evaluation of the possibility of
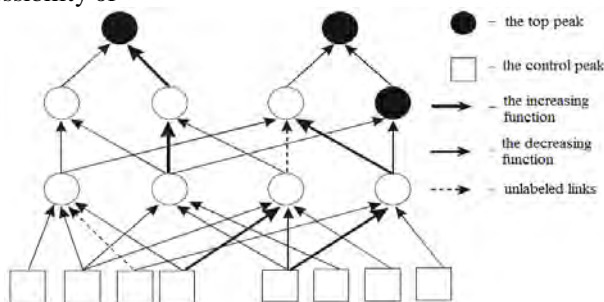

Fig.1 The MBN

the MBN usage for the synthesis of AN was made and the directions in which the use of the MBN will allow to optimize and to improve already developed model were identified. The MBN are designed to control process of solution search. The principle of the model lies in the formation of a sequence of control impacts, in other words a plan to achieve the final results. Every peak of the MBN has a value. The peak is a function of one or more lower peaks. The value of H_r for every top peak is calculated as a sum of all values of her arcs as in Eq.1.

$$H_r = \sum_i h_r^i \tag{1}$$

The solution process is a cycle. The "best" control action is chosen on each step and a model of the new situation is formed. The "best" control action is defined as the maximum of H_r's value.

The initial research has shown that the MBN usage in AN is possible in the following types of tasks:

1. Geographical positioning tasks. Determination of the best location of all access nodes.

2. The task of routing, both for separate user and within the AN as a whole.

3. The tasks connected with the elucidation of the topological structure of AN and the determination of the best route of information transmission.

Task solution is a laborious and long-term process, because various parameters influence on the choice of the optimal variant of AN. One of solutions of the problem of synthesis of AN topology for practical corroboration of the feasibility to use MN in AN design is discussed in the work.

III. CONCLUSION

In the course of the study preliminary results on the possibility to use the MBN in tasks AN design are obtained and guidelines for further researches are given.

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Anton Bondarenko – Odesa State Academy of Refrigeration, Dvoryanska str., 1/3, Odesa, 65082, Ukraine, E-mail:osareni@mail.ru