Necessary capacities of computer networks` core components

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Abstract. The creation and development of computer networks and data centers [1] involves considerable expenses. Minimizing these expenses is important. In this paper, the backbone subnet and server set of wide area computer networks are examined to determine the necessary capacities of their channels, routers and servers, considering the linear dependence of their costs on their capacity. The proposed in this aim queuing network model is an extension of the respective model for channels proposed by L. Kleinrock [2] based on Jackson's theorem [3].

With this model, two optimization problems are considered: (a) minimizing the average time in the network of user's data processing requests; (b) minimizing the summary cost of the network's servers, channels and routers. For both problems, analytical solutions regarding the necessary capacities of channels, routers and servers are obtained. They can be useful for the preliminary estimation of basic characteristics of common core components of a concrete computer network. Also, if necessary, two algorithms to adjust the analytical solutions to the allowed capacities of the network components in question are proposed.

References

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