DECISION-MAKING METHOD ON THE CHOICE OF MOBILE NETWORK

Globa L.S., Kurdecha V.V., Mukhtarov R.E.
Scientific adviser: Nerush V.B.
National technical university of Ukraine "Kyiv Polytechnic Institute", Ukraine
E-mail: radmir_em@bigmir.net

Abstract — The problem of selecting a communication network to provide a service to the subscriber is considered. The method of making a decision on the choice of the network, based on some qualitative is described.

1. Introduction

For the receipt of service in perspective communication networks, user has the opportunity to use a multifunction subscriber device as a terminal of SDR(Software Defined Radio), working as on principle of programmatic management protocols and parameters of interfaces of radioaccess [1, 2]. There is economic feasibility to choose different communication networks for the receipt of the required service in these devices. The method of decision of task of choice of mobile network of SDR is in-process considered a terminal, that in certain terms gives the best quality of service to the subscriber, corresponding criteria offer for what.

2. Main Part

Actuality of choice of communication network for access to service is conditioned by that a modern user can get the same service, for example vocal information transfer, by means of multifunction subscriber device able to support radio interfaces and protocols of different communication networks. Therefore at the use of device of SDR, user technologically hardly is not «tied» to the certain network of certain standard [1, 2]. The choice of communication network according to the requirements of user it is necessary to conduct an analysis and research of this situation, especially taking into account three basic parameters of QoS in networks with package commutation, which are the key to the network performance. These three parameters: delay of packages, loss of packages, jitter, that in totality render substantial influence on quality of connection. An aim of development of corresponding method of choice of network is determination of the best communication network for satisfaction of requirements of user to quality of connection taking into account present data about the indexes of work of network.

For the decision-making method on the choice of network on the basis of some quality indexes, a special mathematical tool which make it possible to determine the most suitable network connection to provide a service at a given time. It is applicable to a large number of networks and a large number of well-known high-quality network performances. As a criterion of decision-making BL (MM) — criterion is selected [3]. This criterion is derivative from the classic criterion of Bayes — Laplace (BL — criterion) and from the extended minimax criterion (MM — criterion). After consideration of all available user networks and qualitative indicators, we get the summary table, which indicates a «rating» of all available networks. The network, which has received the greatest number of points — is the most appropriate. Table 1 is an example of the summary table (for the two networks).

Table 1

	Total (normalized total value)
Network 1	−10
Network 2	3

The simplified network selection algorithm, based on qualitative indicators of functioning using BL (MM)-criterion, can be described as follows:

1) Determination of the number of networks to choose Classes of service determination.

2) Determination of utility solutions of choice (win or loss) for the user.

3) The reduction of a range of possible gains and losses in the table.

4) Determination of state network probabilities, when the user can get a win for a given parameter.

5) Choosing the criteria for network selection (for this method, we choose the BL(MM) — criterion [5]).

6) Border risk selection ε_{pos}, which characterizes the allowable deviation for the user by considering parameter of quality.

7) The reference value of winning determination (Z_{MM}) within the confines of MM — criterion (the best of the worst options).

8) Acceptable values of quality indicators for each of the networks determination within the confines of BL (MM) — criterion.

9) Determination of the worst performance indicators of the network in comparing with ε_{pos}.

10) Determination of the highest user's win in comparing with Z_{MM}.

11) Choosing the appropriate network considering ε_{pos} within the confines of BL (MM) — criterion.

3. Conclusion

The problem of network choosing to provide a service to subscriber for subscriber multifunctional SDR devices, where there is a technical possibility to choose different networks to obtain the required services, is discussed in this article. The method of making a decision on choosing the network based on some quality indicators have been described. Mathematical tool that enables to choose the communication network based on several quality indicators of functioning has been proposed for the second method. Also algorithm for solving this problem has been described.

4. References

[1] Silin A. Technology Software Defined Radio. Theory, principles and examples of hardware platforms / A. Silin. — ," Wireless. — 2007. — №2. — P. 22 — 27.

[2] Bard J. Software defined radio: the software communications architecture / J. Bard, V.J. Kovarik. — Chochester: Wiley, 2007. — 373 p.

[3] Rodionov I. Systems theory and systems analysis / Виктор Сафронов. — http://victor-safronov.narod.ru/systems-analysis/lectures/rodionov.html. — 05.02.2013.