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MODEL TO IMPROVE REQUIRED QUALITIES OF TRANSMISSION RATE IN WIMAX TECHNOLOGY DOWNLINK

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The given work presents mathematical model of sub-channels distribution using various kinds of objective functions in offered model is directed to allocation of minimum data rate transmission of every user station. Subcarrier frequency is primary building block of OFDM method that using to distribute sub-channel for users as in this work used submode OFDMA FUSC Full Usage of Subcarriers, the element of frequency resources, called the sub-channel.

As a result task of frequency resources allocation should be reduced to the problem of sub-channels allocation between user network stations In course of solving problem of sub-channels allocation within offered model network it is necessary to provide account of Boolean control variable (x_n^k). In addition to calculation of required variables it is necessary to meet a number of important conditions, restrictions [1, 2]:

1) Condition of fixing of k -th sub-channel only for one subscriber

station:
$$\sum_{n=1}^N x_n^l \leq 1 \quad (l = \overline{1, L});$$

2) Condition selection of n -th user desired rate:
$$r_k^n \sum_{k=1}^K x_n^k \geq R_{req}^n,$$

where r_k^n – bandwidth capacity of k -th sub-channel (SC), fixed at n -th subscriber station (SS), which depends on modulation used scheme and coding (Modulation and Coding Scheme, MCS).

Calculation of required variables (x_n^k) should be conducted in the course of solving the optimization problem, providing minimum or maximum preselected criterion of quality solutions sub-channel allocation problem in wireless WiMAX technology. Basic requirements for optimal

criterion is attributed, on the one hand, corresponding physics of problem to be solved, i.e. sub-channel allocation problem, and on the other, possibility of obtaining based on it practically workable solutions (results). Thus, the formulation of task should not be too complicated, and its solution must be known or developed an effective method. As a result of mentioned optimality criterion [2] can be represented in the form of:

$$\min \vec{f}^T \vec{x},$$

where \vec{f} – weight vector, \vec{x} – vector of control variables (x_n^k).

Using optimality criterion (1) is aimed minimizing the frequency resource allocated to all user stations. Fig. 1 shows results of sub-channels allocation.

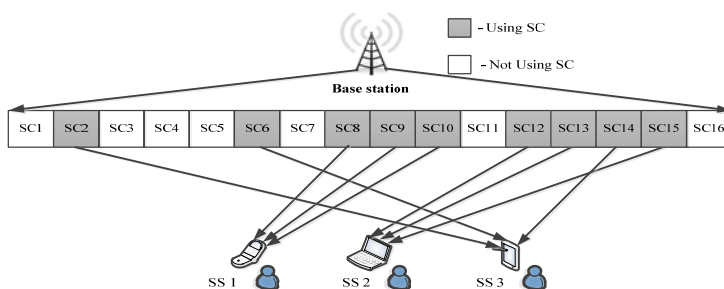


Fig. 1. Example of sub-channels allocation

Conclusion

[1] Лемешко А.В., Гоголева М.А. Модель структурной самоорганизации многоканальной MESH-сети стандарта IEEE 802.11 [Электронный ресурс] // Проблемы телекоммуникацій. – 2010. – № 1 (1). – С. 83 – 95. – Режим доступа: http://pt.journal.kh.ua/2010/1/1/101_lemeshko_mesh.pdf.

[2] Al-Janabi H.D.K. Model Guaranteed Transmission Rate Providing in WiMAX Downlink [Электронный ресурс] / H.D.K. Al-Janabi, A.M.H. Al-Dulaimi, A.H. Abed // Проблемы телекоммуникацій. – 2013. – № 1 (10). – С. 82- 90. – Режим доступа до журн.: http://pt.journal.kh.ua/2013/1/1/131_janabi_wimax.pdf.