

## **OPTIMISATION AND MODELLING OF QUEUES IN TELECOMMUNICATION SYSTEMS WITH HETEROGENEOUS TRAFFIC**

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Modern telecommunications systems are challenged by the increasing volume of heterogeneous traffic, which requires efficient queue management techniques to ensure high throughput and minimise latency. Challenges include ensuring quality of service (QoS) for different types of traffic in a resource-constrained environment.

To optimise resources in telecommunications networks, mathematical queuing models such as M/M/1 or M/G/1 are used. However, modern conditions require more complex models with many types of service. Queue management methods such as Priority Queuing and Weighted Fair Queuing require additional adaptation to changing network conditions.

Recent studies show the effectiveness of adaptive algorithms that change the processing strategy depending on the network state. The use of machine learning to predict loads and adjust the control strategy can increase efficiency during peak load conditions [1].

The integration of artificial intelligence methods allows queue management strategies to be adapted to new conditions without human intervention. Hybrid control models combining classical methods with artificial intelligence algorithms are promising, which significantly improves network efficiency.

Queue management in telecommunication systems requires the integration of classical and innovative methods, which will ensure optimisation of their efficiency in the future.

### **References:**

1. Voronets, V., & Pustovoitov, P. (2024), "A method for forming a packet transmission plan at peak network load which reduces feedback", *Systems of Control, Navigation and Communications*, 2024, No. 1, 185, doi: 10.26906/SUNZ.2024.1.185.