Packet processing analysis in an IAB network node using a polling model with two queues

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Integrated Access and Backhaul (IAB) technology enables the deployment of a dense network using repeater nodes instead of fully equipped base stations, thereby reducing the cost of transitioning to next-generation networks.

Most research on IAB networks is conducted using simulation tools and discrete-time model construction. In this paper a mathematical model for the boundary node of an IAB network operating in half-duplex mode was proposed. The model is presented as a polling system with two queues, formulated as a random process in continuous time, and analyzed using queueing theory, integral transforms, and generating functions (GF) apparatus. Consequently, analytical formulas for the GF, marginal distribution, raw, and central moments of the number of requests in queues, corresponding to packets awaiting transmission by the relay node through access and backhaul channels were derived.