

Intelligent Traffic Steering in O RAN: A Deep Proactive Throughput and Resource Co-optimization

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Abstract—Future cellular networks are moving toward disaggregated, cloud-native, and programmable architectures, with open radio access network (O-RAN) emerging as a key enabler. O-RAN introduces intelligent control and data-driven optimization into conventional RAN deployments. However, optimizing resource allocation alone is insufficient to meet the diverse and dynamic traffic demands. Traffic steering (TS), which intelligently guides user traffic to the most suitable radio resources, provides a more adaptive and performance-aware solution. In this paper, we present a proactive deep learning framework for traffic steering in O-RAN, using next-slot predictions of throughput, RB usage, and BLER. A BiLSTM model running in the non-real-time RAN intelligent controller (non-RT-RIC) forecasts these indicators to enable adaptive traffic allocation. We formulate a prediction-informed throughput resource co-optimization problem that maximizes throughput, enhances RB efficiency, and reduces BLER by intelligently distributing traffic across multiple RUs. We then propose a Gurobi-based linear programming to obtain a near-optimal allocation matrix. The proposed prediction and optimization framework is lightweight, scalable, and deployable within the non-RT-RIC. Experimental evaluations demonstrate that our proposed method significantly outperforms traditional equal-split and greedy baselines, achieving up to 13-62% higher throughput, 30–32% lower BLER, and 0.20–0.25% better RB utilization efficiency.

Keyword—O-RAN, traffic steering, proactive, Gurobi, deep learning, non-RT-RIC, optimization.



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