

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

Mrityunjoy Gain\*, Avi Deb Raha\*\*, Girum Fitihamlak Ejigu\*\*, Dong Uk Kim\*\*, and Choong Seon Hong\*\*

\*Department of Artificial Intelligence, Kyung Hee University, Yongin-si, South Korea

\*\*Department of Computer Science and Engineering, Kyung Hee University, Yongin-si, South Korea

gain@khu.ac.kr, avi@khu.ac.kr, girumfitex@khu.ac.kr, g9896@khu.ac.kr, cshong@khu.ac.kr

**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.



**Mrityunjoy Gain** (SM'23) received the B.S. degree in computer science from Khulna University, Bangladesh, in 2021. Currently, he is doing the M.S. leading PhD in Artificial Intelligence at Kyung Hee University, Korea, and working in the Networking Intelligence Lab. His research interests include computer vision, continual learning, deep learning, Open RAN, 6G, and pattern recognition.



**Avi Deb Raha** (SM'23) received the B.Sc. Engineering degree in computer science and engineering from Khulna University, Khulna, Bangladesh. He is currently a Ph.D. Researcher with the Department of Computer Science and Engineering Kyung Hee University, Yongin-si, South Korea. His research interests include trustworthy edge AI, semantic communication, clouds, machine learning, and computer vision.



**Girum Fitihamlak Ejigu** received his B.Sc in Electrical and Computer Engineering from Addis Ababa University, Ethiopia in 2014. From 2020 to 2022, he studied at Myongji University, Republic of Korea, and received an M.S. degree in Information and Communication Engineering. He is currently pursuing his Ph.D. in Computer Science and Engineering at Kyung Hee University, Republic of Korea. His current research interests include Federated Learning, Federated Optimization, and Machine Learning.



**Dong Uk Kim** received the B.S. degree in electronic engineering with a minor in computer engineering from Korea Polytechnic University (KPU), Siheung, South Korea, in 2022, and the M.S. degree in computer engineering from Kyung Hee University, Yongin, South Korea, in 2023. He is currently pursuing the Ph.D. degree in computer engineering at Kyung Hee University, Yongin, South Korea. His major fields of study include mathematical optimization and deep reinforcement learning..



**Choong Seon Hong** (SM'95, M'97, SM'11, F'23) received the B.S. and M.S. degrees in electronic engineering from Kyung Hee University, Yongin-si, South Korea, in 1983 and 1985, respectively, and the Ph.D. degree from Keio University, Tokyo, Japan, in 1997. In 1988, he joined KT, Gyeonggi-do, South Korea, where he was involved in broadband networks as a Member of the Technical Staff. Since 1993, he has been with Keio University. He was with the Telecommunications Network Laboratory, KT, as a Senior Member of Technical Staff and as the Director of the Networking Research Team until 1999. Since 1999, he has been a Professor with the Department of Computer Science and Engineering, Kyung Hee University. His research interests include future Internet, intelligent edge computing, network management, and network security. He is a Member of the Association for Computing Machinery (ACM), the Institute of Electronics, Information and Communication Engineers (IEICE), the Information Processing Society of Japan (IPSJ), the Korean Institute of Information Scientists and Engineers (KIISE), the Korean Institute of Communications and Information Sciences (KICS), the Korean Information Processing Society (KIPS), and the Open Standards and ICT Association (OSIA). He was the General Chair, the TPC Chair/Member, or an Organizing Committee Member of international conferences, such as the Network Operations and Management Symposium (NOMS), International Symposium on Integrated Network Management (IM), Asia-Pacific Network Operations and Management Symposium (APNOMS), End-to-End Monitoring Techniques and Services (E2EMON), IEEE Consumer Communications and Networking Conference (CCNC), Assurance in Distributed Systems and Networks (ADSN), International Conference on Parallel Processing (ICPP), Data Integration and Mining (DIM), World Conference on Information Security Applications (WISA), Broadband Convergence Network (BcN), Telecommunication Information Networking Architecture (TINA), International Symposium on Applications and the Internet (SAINT), and International Conference on Information Networking (ICOIN). He was an Associate Editor of IEEE TRANSACTIONS ON NETWORK AND SERVICE MANAGEMENT and IEEE JOURNAL OF COMMUNICATIONS AND NETWORKS and an Associate Editor for the International Journal of Network Management and an Associate Technical Editor of the IEEE Communications Magazine. He is currently an Associate Editor for the International Journal of Network Management and Future Internet Journal.