

Enhanced mobile broadband validation over a slice-aware 5G testbed for EdTech applications

2025 IEEE AFRICON, Polokwane, South Africa, 10-12 December 2025

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This work demonstrates an education-focused 5G architecture that delivers comparable streaming quality to geographically separated learners over the same network slice. A centralized core with distributed user-plane functions (UPFs) near Limpopo and Cape Town was evaluated using controlled TCP/UDP traffic. Results show stable, site-independent streaming performance at each campus and fairness when both sites transmit simultaneously on the shared slice. TCP experiments with increasing concurrency exhibited predictable capacity sharing without degrading cross-site experience, while UDP baselines reflected low jitter and minimal loss consistent with smooth video playback. These findings indicate that a single logical slice, anchored by regional UPFs, can provide consistent Quality of Experience across provinces, supporting equitable access to digital learning. Practical tooling constraints limited large-scale parallel UDP evaluation, suggesting future validation with multi-device trials and alternative traffic generators.