Demo: Cross-Technology Interference Nulling for Improved LTE-U/WiFi Coexistence

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ABSTRACT
Smart antennas can unlock the potential of unlicensed spectrum by letting the coexisting networks transmit concurrently without harmful interference. This is possible by strategically allocating the antenna degrees-of-freedom for both beamforming toward the intended receiver and interference nulling toward the victim receiver(s). Our solution, named Xzero, achieves this goal for the particular case of LTE-unlicensed (LTE-U) and WiFi by overcoming the challenges of cross-technology interference nulling by a null search at the LTE-U BS with assistance from the WiFi network. Our demo shows a running prototype of Xzero implemented using USRP SDR platform running srsLTE and commodity WiFi hardware. We illustrate the change in the airtime of colocated WiFi and LTE-U networks upon activation of Xzero and fast reconfiguration of the null beam upon a change in WiFi node’s location.

CCS CONCEPTS
• Networks → Network architectures; Network experimentation;

1 INTRODUCTION
To increase the capacity of cellular networks cost-effectively, LTE-unlicensed (LTE-U) aggregates component carriers from both licensed and unlicensed spectrum, particularly 5 GHz band which is already used by 802.11 (WiFi). While WiFi is coexistence-friendly owing to its listen-before-talk scheme, LTE-U has to implement coexistence techniques for fair and efficient spectrum sharing with WiFi. Current coexistence proposals aim at tuning LTE-U’s access to resources (e.g., time, frequency) such that only one network is active in the band of interest at a certain time. For example, LTE-U has off-periods, whose duration is adapted based on the WiFi activity, to let WiFi network access the medium during such off-periods.

Our proposal in [1] enables instead both LTE-U and WiFi to access the medium by exploiting LTE-U BS’s smart antennas for both beamforming toward LTE-U UE and interference nulling toward the carefully selected WiFi nodes. However, for cross-technology interference nulling (CTIN), LTE-U BS needs the knowledge of instantaneous channel state information to the WiFi nodes. Xzero [3].

REFERENCES