

Incorporating Antenna Beamswitching Technique into Drivers for IEEE802.11 WLAN Devices

Mofolo Mofolo and Albert A. Lysko

Abstract

The use of smart antennas in wireless networks requires real-time synchronization of the beamforming and the transmission/receive processes for the host devices that are equipped with such antennas. This paper presents an approach for integrating the beamswitching technique for switched parasitic array (SPA) and electronically steerable parasitic array radiator (ESPAR) antennas in the drivers for IEEE802.11 WLAN devices. The modifications of the open source drivers (ath5k and ath9k) to enable real-time and perpacket beamswitching are discussed. Such modifications enable: i) the ability to identify and assign the specific directional beam to be used during communication with the neighbor station; as well as ii) the activation of the appropriate beam for the corresponding receiver station as part of setting up of the transmit descriptors. The approach does not alter the basic IEEE802.11 MAC protocol, but facilitates for real-time and per-packet beamswitching during every transmission. The efficiency of the suggested approach was validated through implementation and experimental tests, and 2-3 times improvements in network performance measures such as throughput and latency were observed