修士論文題目　**Development of an Active Phase Shifter for Switched Beam Antenna**（指向性切り替えアンテナ用可変移相器に関する研究）

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A switched beam antenna is typically, an actively driven smart antenna and fits in the same classification as phased array and adaptive array antenna. To deal with complex algorithms, adaptive array antenna requires powerful DSP processors. On the other hand, switched beam or phased array antenna do not require sophisticated processors, because predetermined antenna beam patterns are used either by simple switching circuit or phase allocation.

This thesis has carefully investigated the existence of parasitic phase shifts that occur when the gain of a Low Noise Amplifier (LNA) is varied. Such phase shifts have been characterized and proposed for phase allocation in the implementation of a switched beam antenna. These parasitic phase shifts have been reported in some publications, but have often been dismissed through assumptions, or corrected by phase compensation circuits. In other related research, parasitic phase shifts have simply been overlooked or worse still ignored.

The work in this thesis insists on the usefulness of such parasitic phase shifts, a rather an unconventional approach; contradicting the norm, and exploits them for simple beam switching exercise. As a result, a low profile, low power active phasing, switched beam antenna array operating at 1.85 GHz is developed. Numerical calculation confirms the measured performance of the developed antenna. The array comprises two boards namely the antenna board and the control board. Switched (tilted) beams are achieved based on active phase shifts controlled by bias levels of the variable gain amplifier pair on the control board. Measured results using 0.06π and 0.23 π active phases achieved 10 degrees and 15 degrees tilted beams off broadside, respectively. The tilted beams have a fall back option to the broadside when the control phase is set to 0.00π in either case.

The switched beam antenna herein developed, if adopted in wireless ad hoc network environment, is likely to be a good candidate, cost-wise.