Modern wireless communication networks, particularly the upcoming cellular networks, utilize multiple antennas to improve capacity and signal coverage. In these systems, typically an active transceiver is connected to each antenna. However, this one-to-one mapping between transceivers and antennas will dramatically increase the cost and complexity of a large phased antenna array system. In this paper, firstly we propose a digitally steerable beamformer architecture where a reduced number of transceivers with a digital beamformer (DBF) is connected to an increased number of antennas through an RF beamforming network (RFBN). Then, based on the proposed architecture, we present a methodology to derive the minimum number of transceivers that are required for macro-cell and small-cell base stations. Subsequently, in order to achieve optimal beam patterns with given cellular standard requirements and RF operational constraints, we propose efficient algorithms to jointly design DBF and RFBN. Starting from the proposed algorithms, we specify generic microwave RFBNs for optimal macro-cell and small-cell networks. In order to verify the proposed approaches, we compare the performance of RFBN using simulations and anechoic chamber measurements. Experimental measurement results confirm the robustness and performance of the proposed hybrid DBF-RFBN concept ensuring that theoretical multi-antenna capacity and coverage are achieved at a little incremental cost.