A new technology mapper (SELF-Map) for Look-Up Table (LUT) based Field Programmable Gate Arrays (FPGAs) is described. SELF-Map is based on the Stochastic Evolution (SE) algorithm. The state space model of the problem is defined and suitable cost function which allows optimization for area, delay, or area-delay combinations is proposed. Experimental results show that SELF-Map has an overall better performance compared to other algorithms reported in the literature.