A novel compact GPS antenna element that operates at L1, L2 and L5 bands was developed using proximity feeding probe and two stacked high dielectric layers. The antenna size is only 1.2 inches in diameter and 0.5 inches in thickness and contained integrated feeding network to produce a circular polarization radiation via a single 50-ohm SMA connector. A compact array with a diameter of only 4.5 inches was also developed using 6 elements of the said new GPS antenna elements. Prototype antenna and array were fabricated and tested to validate that these new antenna designs produce satisfactory antenna performance for L1, L2 and L5 GPS operation.