Multistatic time-of-arrival (TOA) localization has recently attracted great attention due to performance advantages offered by multistatic radar. In target localization, the relative sensor-target geometry is an important factor that can significantly affect the localization performance. In this paper, we analyze the optimal geometries for a two-dimensional TOA localization configuration commonly presented in the literature with a single transmitter and multiple receivers. Our analysis is based on minimizing the area of estimation confidence region, which is equivalent to maximizing the determinant of the Fisher information matrix. If the coordinate system is rotated such that the bearing angle of the transmitter with respect to the target is zero, an optimal geometry is obtained when a subset of the receivers are collinear with the target at a bearing angle of $\pi/3$ rad and the remaining receivers at a bearing angle of $-\pi/3$ rad. The arrangement of the receivers on either branch of the bearing angles, i.e., $\pi/3$ rad or $-\pi/3$ rad, is decided based on the measurement noise variances at the receivers. We conclude the study with numerical solutions generated by the genetic algorithm and simulation examples for UAV path optimization to verify the accuracy of the analytical findings.