Increasing penetration of variable loads and renewable generation will cause the conventional operation strategy of the distribution system to become less certain and effective. This paper presents a method of determining the minimum loss network configuration of a distribution system with uncertain load and renewable generation. A robust optimization model is proposed wherein the optimal decisions on network configurations and losses are derived in two subsequent steps. The first step enforces the radiality constraint before knowing the actual system loads and output level of renewable generation. Power flows are computed next to achieve minimum network losses considering the worst operating conditions over the uncertainty sets. A mixed-integer two-stage robust optimization formulation and a decomposition algorithm in a master-slave structure are proposed to solve the problem. Results of an illustrative example and two test systems are presented to demonstrate the proposed method.