This paper presents a new and efficient algorithm for multipartitioning an observable power system state estimation network into observable subnetworks. The partitioning algorithm, which uses the spanning tree of an observable network, is based on Markov chains and has a stochastic basis, rather than a heuristic derivation. This algorithm is faster and provides all the possible optimal partitions of a spanning tree. Once the spanning tree is optimally partitioned into full rank subspanning trees, the interconnected lines between the partitioned subnetworks can be obtained directly from the original network. Computational examples using large power networks are given, to illustrate the properties of the proposed algorithm. 