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By means of a binary visibility graph, we present a novel method to study random binary sequences. The behavior of the some topological properties of the binary visibility graph, such as the degree distribution, the clustering coefficient, and the mean path length have been investigated. Several examples are then provided to show that the numerical simulations confirm the accuracy of the theorems for finite random binary sequences. Finally, in this paper we propose, for the first time, three topological properties of the binary visibility graph as a randomness criteria (Received April 29, 2010)