Exercise

Consider a fiber optic network in the form of a binary tree. The root is in Toronto. There are three levels and eight terminal nodes. The three rightmost terminal nodes are in the Boston metropolitan area and the five leftmost nodes are in the New York City metropolitan area. The reliability of each of 14 links $(2 + 4 + 8)$ in the binary tree is p. Assume that all the nodes are always "up." Draw a diagram of the system. The Toronto–Boston link is considered to be operating (reliable) if there is at least one functioning path from Toronto to Boston. Calculate the reliability of the Toronto–Boston connection.

Are the reliabilities of transmissions into the New York and Boston areas independent of each other? Briefly explain in two or three sentences.