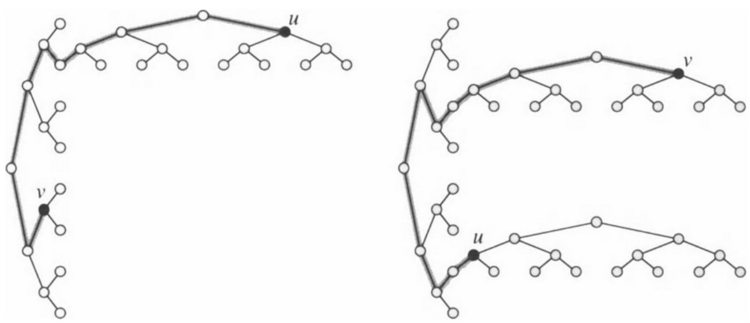
1. Partitioning the mesh into two equal parts of p/2 processors each would leave at least $\sqrt{p}$ communication links between the partitions. Therefore, the bisection width is $\sqrt{p}$. By configuring the mesh appropriately, the distance between any two processors can be made to be independent of the number of processors. Therefore, the diameter of the network is O(1). Each processor has a reconfigurable set of switches associated with it. From Figure 1, we see that each processor has six switches. Therefore, the total number of switching elements is 6p. The number of communication links is identical to that of a regular two-dimensional mesh, and is given by $2(p-\sqrt{p})$.

The basic advantage of the reconfigurable mesh results from the fact that any pair of processors can communicate with each other in constant time (independent of the number of processors). Because of this, many communication operations can be performed much faster on a reconfigurable mesh (as compared to its regular counterpart). However, the number of switches in a reconfigurable mesh is larger.

2. the bisection width: $\sqrt{p}$, diameter: $4\sqrt{p}$



(a) (b)

Figure. Sample short paths in the $\sqrt{p} \times \sqrt{p}$ mesh of trees. Every pair of nodes u and v can be connected by a path of length at most $4\sqrt{p}$. In (a), u is in a row tree and v is in a column tree. In (b), both u and v are in row trees and u is at least as deep as v.

Total number of switching elements

= $2 \times$ Total number of switching elements per row (or per column)

= $2\sqrt{p} \times$ Total number of switching elements in one row

= $2\sqrt{p}(\sqrt{p}-1)=2p-2\sqrt{p}$