Solution

In this problem, the optimal substructure property does not hold. That is, let there be a route from x to y. The path which optimizes average effort to reach y and passes through x need not be the path which minimizes the average effort to reach x. For example, if there is a path to x of average effort 10 and total length 100 and another path of average effort 5 and total length 10. and then length of $x - y$ route is 100 and it's average effort is 20, then it makes sense to choose the first path to x and then go to y. However, if you are given a value of average effort and asked whether it is possible to attain atmost this average effort, then it can be easily tested. Let k be the average value that you want to test. Then let $f(z)$ denote the smallest value of $\sum_{(x,y) on P} dist(x, y) * (effort(x, y) - k)$ over all paths P from which start at the top and end at x. The value of $f(z)$ can be computed for all z using the relation

$$f(z) = min_{(y,z) \in R} f(y) + dist(y, z) * (effort(y, z) - k)$$

If the f value for base is negative, then k is attainable, otherwise it is not. One can do binary search to find the minimal value fo k for which a solution is possible.