evasive path is in NP since we may check, for an s-t path P, whether  $|P \cap Z_i| \leq 1$  for each i.

Now let us suppose that we have an instance of 3-sat with n variables  $x_1, \ldots, x_n$  and t clauses. We create the following directed graph G = (V, E). The vertices will be partitioned into layers, with each node in one layer having edges to each node in the next. Layer 0 will consist only of the node s. Layer i will have two nodes for  $i = 1, \ldots, n$ , three nodes for  $i = n+1, \ldots, n+t$ , and only the node t in layer n+t+1. Each node in layers  $1, 2, \ldots, n+t$  will also be assigned a label, equal to one of the 2n possible literals. In layer i, for  $1 \le i \le n$ , we label one node with the literal  $x_i$  and one with the literal  $\overline{x_i}$ . In layer n+i, for  $1 \le i \le t$ , we label the three nodes with  $\ell_{i_1}, \ell_{i_2}, \ell_{i_3}$ , where  $\{\ell_{i_j}\}$  are the three literals appearing in clause i. Finally, for every pair of nodes whose labels correspond to a variable and its negation, we define a distinct zone Z.

Now, if there is a satisfying assignment for the 3-sat instance, we can define an s-t path P that passes only through nodes with the labels of literals set to true; P is thus an evasive path. Conversely, consider any evasive path P; we define variable  $x_i$  to be true if P passes through the vertex in layer i with label  $x_i$ , and false if P passes through the vertex in layer i with label  $\overline{x_i}$ . Since P does not visit any zone a second time, it must therefore visit only nodes whose labels correspond to literals set to true, and hence the 3-sat instance is satisfiable.

 $<sup>^{1}</sup>$ ex636.680.130