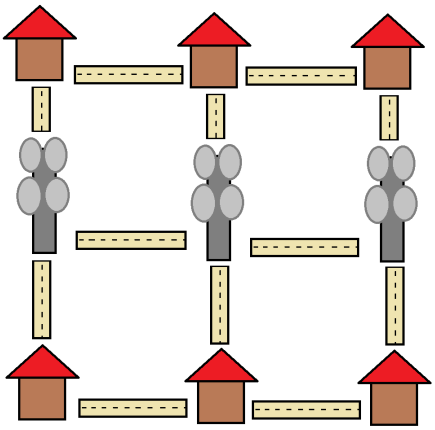
Problem : Solid Signal - Solution

One thing one could try, is replacing the middle row with cell towers:



But as can seen from the example, a more efficient way is possible. After some thinking, we can observe the following things:

- To be efficient, we have to place at most one tower in every column (although in some small cases, we can also efficiently enough cover by putting two towers in one row and none in the rows next to it)
- The first and the last row need a tower, or their neighbouring column would need two towers
- When we have put a tower in a column, we can dodge having to put one in the column right next to it by placing a tower in the column after that
- Note that we cannot keep two columns completely empty without placing two towers in both columns left and right of these two empty columns

Therefore, an efficient way of placing towers is by placing towers in every other column in the middle row. Another way is by placing one tower every two columns, but varying between the lowest and the highest row. Note that in that way of placing towers, we get that every remaining home gets exactly the needed signal coverage. Also, we have to place one tower in the right-most column to give enough coverage there. With the principals noted above, see that these are examples of the most efficient placements, but there are multiple configurations possible.
One thing that is left to determine, is to determine the total amount of towers we place with this technique. When we have that $n \equiv 1 \mod 2$, we can use the technique described above to cover the grid with $\lfloor n/2 \rfloor + 1$ towers. When this is not the case, i.e. when $n \equiv 0 \mod n$, we can cover $n-1$ columns in the way above and we need one more tower to cover the last column. So in this case, we would need $\lfloor (n-1)/2 \rfloor + 1 + 1 = n/2 + 1$ towers.