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Broadcast Independence in Split Graphs

In Graph Theory, the well-known problems of domination, packing and independence are generalized by broadcast domination, broadcast packing and broadcast independence. As an analogy and application, consider a city, where one wants to place cell towers of different signal strengths subject to certain conditions. If every building in the city hears the signal from at least (respectively at most) one tower, then the broadcast is dominating (respectively packing). If no tower hears the signal from another tower, the broadcast is independent. The sum of the tower signal strengths is called the cost of the broadcast. The total cost of a maximum independent broadcast is called the broadcast independence number.

Our research was focused on determining explicit formulas and polynomial time algorithms for the broadcast independence number of various types of graphs. This parameter is difficult to compute for graphs in general, so we restrict the problem to specific classes of graphs to make use of their special structural properties. One type of graph that we examined in our research was split graphs. Split graphs are defined to have a partition of its vertices into a clique and an independent set, a property which is specific to this class of graphs. Additionally, all split graphs have diameter two or three. Using these special properties, we determined explicit formulas for the broadcast independence number of special types of split graphs. We also showed that the broadcast independence number is polynomial time solvable for all split graphs.