Radio Number for Eighth Power Paths

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When two or more distinct radio stations are located within certain proximity of one another, they risk causing each other interference. The task of efficiently assigning channels to distinct transmitters while simultaneously limiting the interference between stations is known as the channel assignment problem. This problem is often modeled using graph theory. Let G be a connected graph. For any two vertices u and v of G, $d(u, v)$ denotes the distance between u and v in G. The maximum distance between any pair of vertices of G is called the diameter of G and is denoted by $\text{diam}(G)$. A *radio labeling* of G is a function f that assigns to each vertex a label from the set $\{0, 1, 2, 3...\}$ such that the following holds for any two vertices u and v in G: $|f(u) - f(v)| \geq \text{diam(G)}-d(u, v) + 1$. The span of f is defined as $max_{u,v \in V(G)}\{|f(u) - f(v)|\}$. The *radio number* of G is the minimum span over all radio labelings of G. The *eighth power* of a graph G is a graph constructed from G by adding edges between vertices of distance eight or less apart. We completely determined the radio number for the eighth power of any path, except when its order is congruent to 1 modulo 16. For the unsolved case, we were able to find a range in which the radio number lies.

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