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Perfect dominating sets

A perfect dominating set S of distance d in a graph G is a set of its vertices so that each vertex of G is at distance at most d from exactly one vertex of S. In 1968 Golomb and Welsh conjectured (they formulated their conjecture in terms of Lee-distance error correcting codes) that a perfect dominating set of distance d in the n-dimensional torus $C_k \times \cdots \times C_k$ exists only in the case for $n = 1$ and any d or $n = 2$ and any d or $d = 1$ and any n. Despite a lot of effort by researchers both in graph theory and in coding theory the conjecture is still open although there are plenty of partial results supporting the conjecture. In this talk we will discuss some variations of the conjecture that are motivated by an application in computer science.