Edge-Nim on the $K_{2,n}$

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Edge-Nim is a combinatorial game played on finite regular graphs with positive, integrally weighted edges. Two players alternately begin from an initialized vertex and move to an adjacent vertex, decreasing the weight of the incident edge to a strictly non-negative integer as they travel across it. The game ends when no incident edge has a nonzero weight and a player is unable to move, in which case, this player loses. We characterize the winner of edge-Nim on the complete bipartite graphs, $K_{2,n}$ for all positive integers, n, giving the solution and complete strategy for the player able to win.