Inverse scattering problem for quantum graphs

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The inverse scattering problem for the Schrödinger operator on a graph having several infinite branches is studied. Such Schrödinger operator is determined by potentials on the branches and certain boundary conditions at the vertices. It is shown that the knowledge of the scattering matrix in general is not enough to reconstruct the potential, the graph, the boundary conditions or even the topological structure of the graph. We discuss possible generalization to the case of quantum graphs of the Borg-Marchenko theorem concerning the uniqueness of the one-dimensional Schrödinger operator.