On k-geodetic graphs and groups

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We call a graph k-geodetic, for some $k \geq 1$, if it is connected and between any two vertices there are at most k geodesics. It is shown that any hyperbolic group with a k-geodetic Cayley graph is virtually-free. Furthermore, in such a group the centralizer of any infinite order element is an infinite cyclic group. These results were known previously only in the case that $k = 1$. A key tool used to develop the theorem is a new graph theoretic result concerning "ladder-like structure s" in a k-geodetic graph.
(joint work with Murray Elder and Kane Townsend)