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Edge sampling is an important topic in network analysis. It provides a natural way to reduce network size while retaining desired features of the original network. Sampling methods that only use local information are common in practice as they do not require access to the entire network and can be parallelized easily. Despite promising empirical performance, most of these methods are derived from heuristic considerations and therefore still lack theoretical justification. To address this issue, we study in this paper a simple edge sampling scheme that uses network local information. We show that when local connectivity is sufficiently strong, the sampled network satisfies a strong spectral property. We quantify the strength of local connectivity by a global parameter and relate it to more common network statistics such as clustering coefficient and Ricci curvature. Based on this result, we also derive a condition under which a hypergraph can be sampled and reduced to a weighted network. (Received August 28, 2018)