We investigate a scalable M-channel critically sampled filter bank for graph signals, where each of the M filters is supported on a different subband of the graph Laplacian spectrum. For analysis, the graph signal is filtered on each subband and downsampled on a corresponding set of vertices. However, the classical synthesis filters are replaced with interpolation operators. For small graphs, we use a full eigendecomposition of the graph Laplacian to partition the graph vertices such that the mth set comprises a uniqueness set for signals supported on the mth subband. The resulting transform is critically sampled, the dictionary atoms are orthogonal to those supported on different bands, and graph signals are perfectly reconstructable from their analysis coefficients. We also investigate a fast version of the proposed transform that scales efficiently for large, sparse graphs. Issues that arise in this context include designing the filter bank to be more amenable to polynomial approximation, estimating the number of samples required for each band, performing non-uniform random sampling for the filtered signals on each band, and efficient reconstruction methods. We empirically explore the joint vertex-frequency localization of the dictionary atoms, the sparsity of the analysis coefficients for different classes of signals, the ability of the proposed transform to compress piecewise-smooth graph signals, and the reconstruction error resulting from the numerical approximations.