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Network delay tomography is a statistical problem with lots of hidden data, so formulating models that are large enough to fit well but small enough to have meaningful parameters is difficult. We propose a model for first and second moments that is a perturbation of cubic polynomials and which includes correlation within neighborhoods of the underlying graph. This model is motivated by theoretical reasoning and empirical studies using the ns2 simulator. It is shown to fit better than independence models on some correlated data. (Received August 02, 2005)