The authors consider the distributed estimation of a Gaussian vector with a linear observation model in an inhomogeneous wireless sensor network, in which a fusion center (FC) reconstructs the unknown vector using a linear estimator. Sensors employ uniform multi-bit quantizers and binary PSK modulation, and they communicate with the FC over orthogonal power- and bandwidth-constrained wireless channels. The authors study transmit power and quantization rate (measured in bits per sensor) allocation schemes that minimize the mean-square error (MSE). In particular, they derive two closed-form upper bounds on the MSE in terms of the optimization parameters and propose “coupled” and “decoupled” resource allocation schemes that minimize these bounds. The authors show that the bounds are good approximations of the simulated MSE and that the performance of the proposed schemes approaches the clairvoyant centralized estimation when the total transmit power and bandwidth is very large. They investigate how the power and rate allocations are dependent on the sensors' observation qualities and channel gains and on the total transmit power and bandwidth constraints. Their simulations corroborate their analytical results and demonstrate the superior performance of the proposed algorithms.