This thesis gives a short introduction into the higher gauge algebras. We first introduce the BRST formalism in the context of ordinary gauge theories and show the properties that allow us to use it in the context of higher gauge theories. We define the 2-groups and show the correspondence between 2-groups and crossed modules. We then give a brief introduction into the theory of L_∞-algebras - we give account of the graded manifolds and Q-manifolds. We give a short account of Homotopy Maurer-Cartan theory and show that it reduces to the BF theory in case of 4-dimensional manifold and 2-term L_∞-algebra.