We consider (p+1)-form gauge fields in flat (2p+4)-dimensions for which the radiation and the Coulomb solutions have the same asymptotic falloff behavior. Imposing appropriate falloff behavior on fields and adopting a Maxwell-type action, we construct the boundary term which renders the action principle well-defined in the Lorenz gauge. We then compute conserved surface charges and the corresponding asymptotic charge algebra associated with nontrivial gauge transformations. We show that for $p \geq 1$ cases we have three sets of conserved asymptotic charges associated with exact, coexact and zero-mode parts of the corresponding p-form gauge transformations on the asymptotic S^{2p+2}. The coexact and zero-mode charges are higher form extensions of the four dimensional electrodynamics case (p=0), and are commuting. Charges associated with exact gauge transformations have no counterparts in four dimensions and form infinite copies of Heisenberg algebras. We briefly discuss physical implications of these charges and their algebra.

Based on arXiv:1801.07752