Type III solar radio bursts are observed to undergo sudden flux modifications - e.g., cutoffs, reductions, and intensifications - when type III electron beams traverse shocks in the upper corona or solar wind. Here the effects on type III bursts of shocks in the upper corona are studied by using large-scale simulations. The simulations incorporate the spatially localized increases in plasma density and electron and ion temperatures downstream of the shock. The density jump across a shock naturally results in a frequency gap in the dynamic spectrum of a type III burst, and sudden changes in the profile of drift rate versus frequency. Usually the localized temperature increases cause significant flux intensifications at frequencies corresponding to the downstream region. These predicted effects are caused by fundamental changes in the quasilinear and nonlinear processes producing the type III bursts, in response to the density and temperature variations. The simulations suggest that coronal shocks may switch beams from radio-quiet state to radio-loud state, leading to observable radiation like stria bursts. Furthermore, the fine structures in type IIIb bursts may be produced by the effects of multiple such shocks located at different heights. The simulations also indicate that type III bursts may provide a useful tool to identify weak shocks in the corona and possibly in the solar wind, when the shocks do not produce type II solar radio bursts.