The skin effect has been extensively studied, although many methods treat the skin effect at high frequencies only, failing to predict the properties of transmission lines at low frequencies. Time domain analysis for digital signal propagation requires models covering the entire frequency range from dc to 1/[[tau]]rise, where [[tau]]rise is the rise time of the signal. Skin effect lumped circuit models in which the elements are frequency independent have been used [1-3], but tend to produce very large ladder circuits. Yen *et al.* [3] introduced a more compact circuit model, but this method failed to accurately capture the skin effect at high frequencies and did not establish clear rules governing the choice of component values. Here we present a modification of Yen's method using simple rules for selecting the values of resistors and inductors for a four deep ladder circuit model. The equivalent circuit accurately models the skin effect in circular cross section conductors up to a frequency corresponding to a 100 skin depth radius conductor. We also show equivalent circuits for the series impedance per unit length for coax and twin lead, including both proximity and skin effects.