In this study, cotton cellulose was cross-linked with 1,2,3,4-butanetetracarboxylic acid (BTCA) via esterification to improve anti-pilling, wrinkle recovery and flame retardant properties of the fabric. Cross-linking was conducted with the presence of sodium hypophosphite (SHP) as the effective catalyst for anhydride formation. Fourier transform infrared (FT-IR) spectroscopy was used to investigate esterification cross-linking structure of the cotton. Water absorption, air permeability, bursting strength, and whiteness change in the fabrics treated with BTCA were also studied. Results indicated that BTCA treatment could act as a multi-functional finishing agent to improve anti-pilling, crease resistance and flame retardant property of the cotton fabric. However it caused decreasing in the bursting strength, air permeability and whiteness of the fabric.