CD103(+)CD11b(+) dendritic cells (DCs) represent the major migratory DC population within the small intestinal lamina propria (SI-LP), but their in vivo function remains unclear. Here we demonstrate that intestinal CD103(+)CD11b(+) DC survival was dependent on interferon regulatory factor 4 (IRF4). Mice with a DC deletion in Irf4 displayed reduced numbers of intestinal interleukin 17 (IL-17)-secreting helper T 17 (Th17) cells and failed to support Th17 cell differentiation in draining mesenteric lymph nodes (MLN) following immunization. The latter was associated with a selective reduction in CD103(+)CD11b(+) MLN DCs and DC derived IL-6. Immunized IL6(-/-) mice failed to support Th17 cell differentiation in MLN in vivo and CD103(+)CD11b(+) MLN DCs supported IL-6-dependent Th17 cell differentiation in vitro. Together, our results suggest a central role for IRF4-dependent, IL-6 producing CD103(+)CD11b(+) DCs in intestinal Th17 cell differentiation.