We adapt the method of Simon to prove a $C^{1,\alpha}$-regularity theorem for minimal varifolds which resemble a cone $C_0^2$ over an equiangular geodesic net. For varifold classes admitting a “no-hole” condition on the singular set, we additionally establish $C^{1,\alpha}$-regularity near the cone $C_0^2 \times \mathbb{R}^m$. Combined with work of Allard, Simon, Taylor, and Naber-Valtorta, our result implies a $C^{1,\alpha}$-structure for the top three strata of minimizing clusters and size-minimizing currents, and a Lipschitz structure on the $(n - 3)$-stratum. This is joint work with Maria Colombo and Luca Spolaor. (Received September 22, 2017)