Research in millimeter dielectric waveguides is experiencing a growing interest for data communication and sensor systems. This paper fully analyzes the properties of the HE_{11} mode in hollow fibers. It will provide a theoretical background that can then be used to choose an appropriate channel for a dielectric waveguide system. The focus of this paper will be primarily laid on linking properties like propagation constant, dispersion, and attenuation with the geometry and frequency. Secondly, as a small cladding is needed in practical millimeter-wave fibers, evaluating the power leaking out of the fiber by means of the evanescent field is addressed. Finally, all theories are extensively verified with measurements and both agree very well.