Abstracts

A novel simplified four-port scattering parameter model for design of four-pair twisted-pair cabling systems for local area networks

This paper presents a set of simplified equations based on a four-port scattering model, which accurately characterizes four-pair twisted pair (eight-port) cabling systems for high-speed digital telecommunication local area networks. These equations are derived and simplified from two-stage cascaded four-port S-parameter matrices and verified experimentally. Excellent agreement is obtained between the measurements and computational results when the S-parameters of the cabling system components are known. These equations not only reduce the computation burdens in comparison with traditional methods for transmission matrix computations, but also provide intuition of the contributions of the S-parameters at each stage in the net crosstalk, return loss, and insertion loss. Furthermore, these equations can be used to compute the component specifications when the system performance is specified, and to obtain the deembedded system characteristics by subtracting the known characteristics of adapters.

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