Abstract. We consider systems of polynomials $\{p_n(\lambda)\}_{n=0}^{\infty}$ which satisfy a recurrence relation that can be written in a matrix form: $Jp(\lambda) = \lambda^N p(\lambda), p = (p_0(\lambda), p_1(\lambda), \dots)^T, \lambda \in C, N \in N$, J is a $(2N+1)$-diagonal, semi-infinite, Hermitian complex numerical matrix. For such systems we obtained orthonormality relations on radial rays. To prove these relations we used the standard method of scattering theory. We showed that these relations are characteristic. From the relations it is easily shown that systems of orthonormal polynomials on the real line, systems of Sobolev orthogonal polynomials with discrete measure at zero, systems or orthonormal polynomials on radial rays with a scalar measure are such systems of polynomials. Also we consider a connection with matrix orthonormal polynomials on the real line.