

# Channel Models and Beamforming at Millimeter-Wave Frequency Bands

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**Abstract:**

Millimeter-wave (mm-wave) radios have been gaining interest as one of the strong enabling physical layer technologies for the fifth- generation (5G) mobile and backhaul access. This paper aims at clarifying possible roles of the mm-wave radios in the 5G development and performing comprehensive literature survey on the radio channel modeling for the feasibility study of a radio link. Emphasis in the literature survey are laid on grasping the typical behavior of mm-wave channels, identifying missing features in the presently available channel models for the design and evaluation of the mm-wave radio links within the 5G context, and exemplifying different channel modeling activities through analyses performed in the authors' group. As a key technological element of the mm-wave radios, reduced complexity beamforming is also addressed. Design criteria of the beamforming are solved based on the spatial multipath characteristics of measured indoor mm-wave channels.