

# Radio-concentric networks: history, facets and spatial modeling

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## **Abstract**

We propose a study of radio-concentric network properties on different points of view (urbanism, geography, ecology, maths). Indeed, those networks are often observed in urban areas, in several cities all over the world. To assess a generalized accessibility, one of the interesting properties of such networks is described by the straightness measure from graph theory, which assesses how much moving from one node to another along the network links departs from the network-independent straightforward path. Another property is the betweenness centrality that expresses how much a network section can be travelled according to its relative position in the graph and to the potential flow that can cross it. We study these properties in both rectilinear and radio-concentric networks, first by analyzing mathematically routes from the center to peripheral locations in a theoretical framework with perfect topology, then using simulations for multiple origin-destination paths. We show that in most of the cases, radio-concentric networks have a better straightness than rectilinear ones and show a peculiar spatial distribution of the betweenness centrality, surprisingly related to the foraging fitness of a virtual spider on its orbweb... How may these properties, somehow bio-inspired, be used in future utopic (urban) networks?