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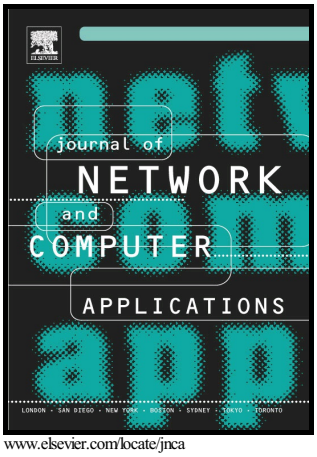

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Adaptive Router Node Placement with Gateway Positions and QoS Constraints in Dynamic Wireless Mesh Networks[☆]

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Abstract

Conventionally, router node placement is concerned with placing only routers to serve clients; and gateway placement is concerned with placing only gateways to achieve some requirements for routers. More generally, this work considers the placement with routers and gateways simultaneously, while clients can move based on their own willingness. That is, this work investigates the adaptive placement problem of a dynamic wireless mesh network (dynWMN) consisting of mesh clients, mesh routers, and Internet gateways. Given fixed positions of Internet gateways, this problem is to adjust positions of mesh routers dynamically to make each mesh client connected with some gateway via multi-hop communication at different times, when each mesh client may switch on or off network access, so that both network connectivity and client coverage are maximized, subject to the Quality of Service (QoS) constraints of delay hops, relay load, and gateway capacity. To avoid almost-overlapping routers and few-clients-covered routers in router node placement, this work further proposes a novel particle swarm optimization approach with three local search operators. In simulation of dynWMNs, dynamics of mesh clients can be characterized by a Markov chain,

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