g-second countable spaces and the Axiom of Choice

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A topological space X is g-second countable if it has a weak local base $(\mathcal{N}_x)_{x \in X}$ such that $\bigcup_x \mathcal{N}_x$ is countable. Clearly a second countable space is g-second countable, but the reverse is also true for metric spaces.

Using the Axiom of Countable Choice, one can prove that a metric space is g-second countable iff it is separable iff it is Lindelöf. In this talk we will discuss the set-theoretic status of these equivalences as well as other results related with g-second countable and g-first countable spaces.

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