**Public transport networks under random failure and directed attack**

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The behavior of complex networks under failure or attack depends strongly on the specific scenario. Of special interest are scale-free networks, which are usually seen as robust under random failure but appear to be especially vulnerable to targeted attacks. In a recent study of public transport networks (PTNs) of 14 major cities of the world we have shown that these systems when represented by appropriate graphs may exhibit scale-free behaviour [Physica A 380, 585 (2007)]. Our present analysis focuses on the effects of defunct or removed nodes on the connectivity properties of a PTN. We confirm that the impact of random failure is weak and that for a moderate share of defunct nodes there is little to no change in the network behaviour. Simulating different directed attack strategies however, we derive vulnerability criteria that result in minimal strategies with high impact on these systems.

The correlations between the properties measured for the undisturbed networks and their behavior under attack which we observe are shown to be explained by percolation theory on scale free networks.

Surprisingly we find that the PTNs of cities of similar history and structure may exhibit very different vulnerability levels.