

Topology Connectivity Analysis of Internet Infrastructure Using Graph Spectra

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Understanding and modelling the Internet has been a major research challenge in part due to the complexity of the interaction among its protocols and in part due to multilevel, multidomain topological structure. It is therefore crucial to properly analyse each structural level of the Internet to gain a better understanding, as well as to improve its resilience properties. In this paper, first we present the physical and logical topologies of two ISPs and compare these topologies with the US interstate highway topology by using graph metrics and then using the normalised Laplacian spectrum. Our results indicate that physical network topologies are closely correlated with the motorway transportation topology. Finally, we study the spectral properties of various communication networks and observe that the spectral radius of the normalised Laplacian matrix is a good indicator of graph connectivity when comparing different size and order graphs.