Private Internet Acess System

Network virtualization is widely considered to be one of the main paradigms for the future Internet architecture as it provides a number of advantages including scalability, on demand allocation of network resources, and the promise of efficient use of network resources. In this paper, we propose an energy efficient virtual network embedding (EEVNE) approach for cloud computing networks, where power savings are introduced by consolidating resources in the network and data centers. We model our approach in an IP over WDM network using mixed integer linear programming (MILP). The performance of the EEVNE approach is compared with two approaches from the literature: the bandwidth cost approach (CostVNE) and the energy aware approach (VNE-EA). The CostVNE approach optimizes the use of available bandwidth, while the VNE-EA approach minimizes the power consumption by reducing the number of activated nodes and links without taking into account the granular power consumption of the data centers and the different network devices. The results show that the EEVNE model achieves a maximum power saving of 60% (average 20%) compared to the CostVNE model under an energy inefficient data center power profile. We develop a heuristic, real-time energy optimized VNE (REOViNE), with power savings approaching those of the EEVNE model. We also compare the different approaches adopting an energy efficient data center power profile. Furthermore, we study the impact of delay and node location constraints on the energy efficiency of virtual network embedding. We also show how VNE can impact the design of optimally located data centers for minimal power consumption in cloud networks. Finally, we examine the power savings and spectral efficiency benefits that VNE offers in optical orthogonal division multiplexing networks.

Domain: Java / Web Applications
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