Dynamic energy management employing renewable energy sources in IP over DWDM networks

The continued growth of energy consumption has been one of the main constraints for the development of the Internet. The increasing emissions of greenhouse gases associated with electricity generation also raise public concern for the environment. In this paper, we propose a dynamic energy management framework employing renewable energy sources in IP over DWDM core networks. The main concept is to combine infrastructure sleeping and virtual router migration to improve the network energy efficiency. By using the energy source information provided by the smart grid, the nodes that are powered by a renewable energy source are selected, where possible, for hosting virtual routers during off-peak hours. Therefore, the energy consumption and CO2 emissions are both reduced. A heuristic algorithm based on a multi-objective evolutionary algorithm is proposed to select appropriate physical platforms to host the virtual routers.