Traffic-aware Elastic Optical Networks to leverage Energy Savings

Because of the static nature of the deployed optical networks, large energy wastage is experienced today in production networks such as Telecom networks. With power-adaptive optical interfaces and suitable grooming procedures, we propose the design of more energy-efficient transport networks. Optical network reconfigurations are performed by GMPLS node controllers according to monitored traffic information. The investigated energy reduction strategies are simulated on two large-scale transport networks (DT17 and COST37). The results show that the energy savings obtained by these strategies depend on the variability of the carried traffic and the characteristics of the network topology. For medium-size DT17 network, significant (more than 37%) power savings are achieved only with symbol-rate adaptation while less savings are achieved for modulation format adaptation. In case of pan-European COST37 network, for both symbol-rate and modulation format adaptations, significant savings are obtained. Mixed adaptation (jointly performing symbol-rate and modulation format adaptations) used together with optical grooming allows up to 44% and 47% power savings in DT17 and COST37 networks respectively, close to the optimum power savings case (48.2%) computed when the power follows exactly the traffic demand pattern.