STAR

Abstract
SwiTching And tRansmission

In this project we adopt the Core Switching and Routing GreenTouch energy saving target of 100 and believe this ambitious target is achievable. A key observation in core networks is that most of the power is consumed in the IP layer while optical transmission and optical switching are power efficient in comparison, hence the inspiration for this project. Therefore we will introduce energy efficient optimum physical network toplogies that encourage optical transmission and optical switching at the expense of IP routing whenever possible. Initittial studies by the applicants show that physical topology choices in networks have the potential to reduce the power consumption by a factor of at least 20, however network optimization and the consideration of traffic and the opportunities afforded by large, low power photonic switch architectures will lead to further power savings. We will investigate a large photonic switch architecture in this project, minimize its power consumption and determine optimum network physical topologies that exploit this switch to minimize power consumption. We believe that a power saving by a factor of at least 10 in the photonic switch power consumption is possible through our new designs. We will design new large photonic switch fabrics, based on hybrid semiconductor optical amplifiers (SOA) / Mach Zehnder interferometers as gating elements to minimise the switching energy per bit, and plan to optimize the network architecture making use of these new switch architectures and introduce on chip (photonic switch) power monitoring to inform higher layer decisions. Networks are typically 3 to 5 times over provisioned at present to maintain quality of service. We will study optimum resource allocation to reduce the overprovisioning factor while maintaining the quality of service. Here power savings by a factor of at least 3 are possible. Protection is currently provided in networks through the allocation of redudent paths and resources, and for full protection there is a protection route for every working route. We will optimize our networks to minimize power wastage due to protection and will consider for the first time in core networks the impact of embodied energy (energy used to manufacture the network components) to reduce the overall carbon footprint of the network. The power savings due to optimum physical topology design, optimum resource allocation, power saving due to optical switching instead of IP routing and more efficient photonic switches and the power savings due to energy efficient protection can be combined and therefore the investigators and their industrial collaborators BT, Alcatel Lucent and Telekomunikacja Polska, believe that an ambitious factor of 100 power saving in core networks can be realised through this project with significant potential for impact.
(2011)
Green ICT, towards Zero Power ICT

Partnership & Contact

STAR starts in December 2012, lasts 36 months and involves the partnerships below. The financial support of CHIST-ERA is about 1400000 €.

Partnership	
INRIA	France
University of Cambridge	United Kingdom
University of Leeds	United Kingdom
AGH University of Science and Technology Department of Telecommunications	Poland

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- Administration

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