Proposition de sujet de stage

PERFORMANCE STUDY OF SWITCH-ROUTER ARCHITECTURE UNDER QoS CONSTRAINTS IN OPTICAL NETWORKS

Proposed by Prof. Tülin ATMACA

IMT/Telecom SudParis

tulin.atmaca@telecom-sudparis.eu

The rapid growth in client application demands, in terms of bandwidth and Quality of Service (QoS), has motivated the deployment of the optical technology at Metro Access, Metro Core and Core Networks. More diverse and more intelligent optic devices are required for efficiently management of huge capacity in the network. The explosion in demand for network bandwidth is mainly due to the growth in data traffic whose nature is also becoming more and more complex. The traffic growth hypothesis predict that the traffic shall double every years (40 % per year) .In general, most of service-based traffics are transported in networks which are now being dominated by the optical circuit switching technology. Nevertheless, such technology has some drawbacks such as inflexible and non-scalable properties. Optical packet switching (OPS), which offers significant benefits in terms of both network efficiency and control scalability, may overcome these limitations. This has motivated the orientation from optical circuit switching to optical packet switching in the future network infrastructure.

The design of new architectures for switch-router in metro core and core networks has become a very important research subject. New efficient component and network architectures in term of energy efficient and high performance under QoS constraints are required by the operators. A switch-router architecture which supports a large number of WDM channels cost effectively by monitoring relatively small set of shared through expensive electronic switching parts; and the reconfiguration of the number of WDM in each fiber are desired proprieties. The implementation of different switching techniques (electronic packet switching, optical circuit switching or optical packet switching), to choose the adequate mechanism according to traffic demand and allowing to each WDM channel change from one switching mode to another one can improve the network performance.

The student will study and propose new architecture and protocols of switching router for core networks. The contributions must consider QoS constraints, energy saving modes and will be implemented to evaluate the network performances.

The student will also identify, analyze and propose some protocols, control plane, and functionalities of switch-router for core network. He will analyze possible transfer mode as single/multi wavelength circuit/packets. We need to define several scheduling mechanisms to ensure the optimal functionality of nodes to obtain higher level of performance criteria as PLR (Packet Loss Rate), latency, etc…To evaluate the proposed approaches; the student could study the impact of the mechanisms on the network performances by using some numerical methods or the simulation. We will compare the obtained gain in terms of energy and performance with existing solutions.

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