

Master thesis No. 1005

Design and Implementation of a FlexGrid Simulative Environment and Evaluation with a Routing and Spectrum Assignment Algorithm



Methods

Programming in Java
Object-oriented programming
Simulation

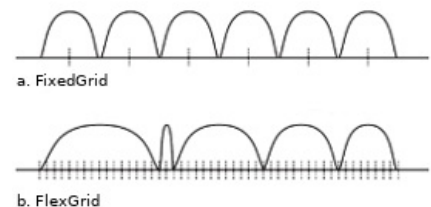
Topics

Optical networks

Background

The explosive internet growth witnessed in the last years brought networks close to the capacity limit of conventional fiber. For this reason, the paradigm of Flexible Optical Networks (FON) emerged, promising utmost resource utilization and boosting the amount of data in the fiber.

An important part of the new FON paradigm is FlexGrid. In comparison with FixedGrid, an older multiplexing scheme, FlexGrid divides the spectrum into tiny frequency slots and allows the reservation of a group of wavelength slots. This leads to finer allocation granularity, yielding less spectrum loss, less electrical grooming and more throughput.



For the new FlexGrid approach, new algorithms had to be developed, known as Routing and Spectrum Assignment (RSA) algorithms. These algorithms need to efficiently allocate traffic demands in the available spectrum, ensuring zero-interruption operation and defragmentation, and also route these demands through the network.

Problem Description

This work includes the design and implementation of a FlexGrid simulation environment, and its evaluation with the development of an RSA algorithm. It consists of the following steps:

- research the literature to gain a robust understanding of the wavelength allocation issue
- extend the institute's network simulation tool to support FlexGrid allocation
- select and implement an RSA algorithm after thorough literature investigation
- evaluate the performance of the algorithm

Acquired Knowledge and Skills

Through the work on this thesis, you will get a great insight into modern optical networks and especially into efficient hardware resource allocation. You will learn how to evaluate a complex system through simulation and gain experience in using and developing an extensive, modular framework in Java by modeling the FlexGrid technology.

Requirements

Communication Networks Architecture and Design
Programming Experience in Java

Desirable knowledge

Kommunikationsnetze I

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