

Computer Aided Design of Long-Haul Optical Transmission Systems

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ABSTRACT

We present a general overview of the role of computer models in the design and optimization of commercial optical transmission systems. Specifically, we discuss (1) the role of modeling in a commercial setting, (2) achieving the proper balance between accuracy and computation speed, (3) model verification against experiment, and (4) case studies demonstrating the benefits of modeling. Ideally, experiments are preferable to models when describing system performance, particularly to support claims of a system's functionality to a customer. However, modeling is often the only choice for many of the problems that a commercial networking company must solve. Because there are design parameter spaces that are either too expensive or too time-consuming to verify experimentally, the main role of modeling in industry is to study what experiments cannot. For example, when an analytical solution of a statistical problem is infeasible, a common modeling solution is to perform Monte Carlo trials to study the statistical behavior. Another typical modeling task involves looking at variations of hardware that would be prohibitively expensive to acquire and test. Implementing modeling in industry involves a balance between three needs:

cost-efficiency, time-efficiency, and accuracy. We will discuss the approaches we have taken at PhotonEx to meet these needs: leveraging academic research, developing "reduced models" and utilizing computational clusters. Specifically, we will use case studies to illustrate the application of these approaches to modeling long-haul optical transmission systems.

Categories and Subject Descriptors

J.6 [Computer Applications]: Computer-Aided Engineering - *computer-aided design (CAD) and computer-aided manufacturing (CAM)*.

General Terms

Algorithms, Measurement, Performance, Design, Experimentation, Theory, Verification

Keywords

Optical Communication, Long-Haul (LH) Transmission, Ultra-Long Haul (ULH) Transmission, Optical Modeling

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