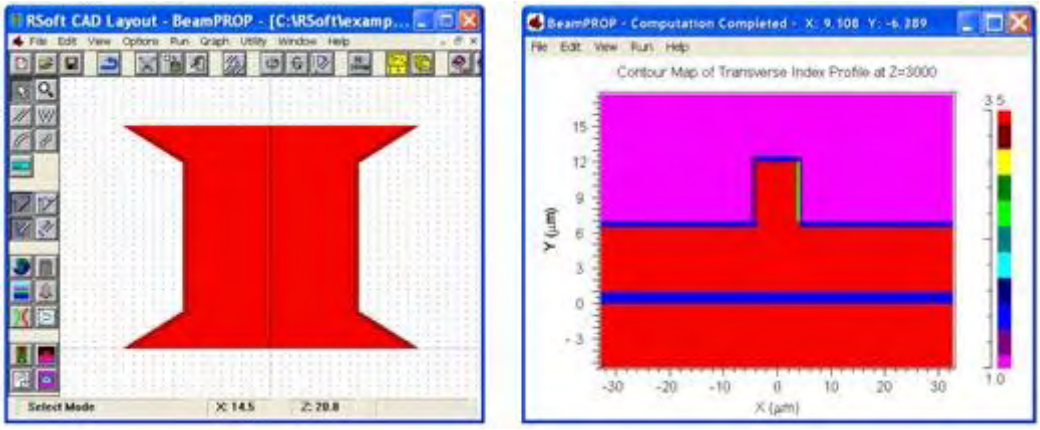
Spatial BeamPROP Interface: Waveguide Example

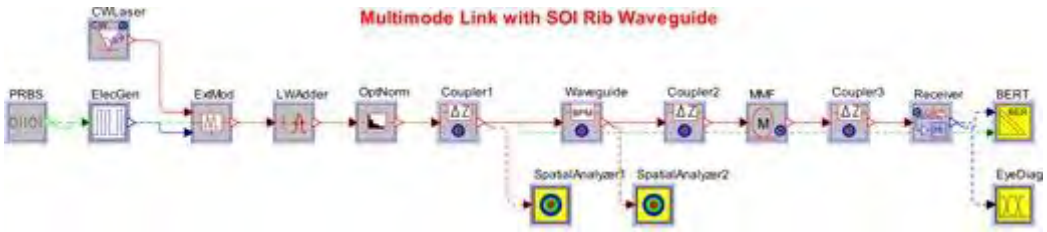
Tools Used: ModeSYS and BeamPROP

In this example, we use the Spatial BeamPROP Interface to simulate the use of a silicon-on-insulator (SOI) rib waveguide for coupling of an externally modulated laser to multimode fiber.

The figure below on the left depicts a top view of the waveguide and on the right is the transverse index profile of the waveguide in this central region (BeamPROP):

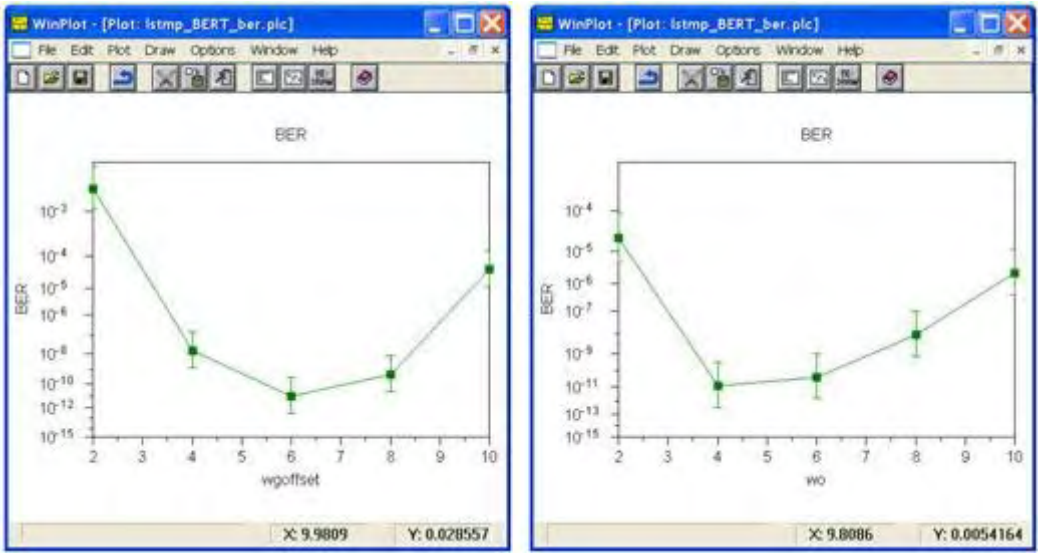


The link topology is shown in the figure below:



The link consists of the following sub-components: a transmitter consisting of a 1310-nm externally modulated laser driven by a PRBS-modulated electrical signal, a Spatial Coupler that simulates misalignment of the transmitter and rib waveguide, the rib waveguide, simulated via a call to BeamPROP using the Spatial BeamPROP Interface, another Coupler to simulate any misalignment between the waveguide and multimode fiber, 300 meters of 50-micron multimode fiber, and a receiver, coupled to the multimode fiber via another Coupler.

Of particular interest in this topology is the impact of the waveguide on the overall link performance. For example, how does the link BER vary as a function of transmitter-waveguide alignment or the transmitter output beam's spot-size parameter? To answer these questions, we will make use of ModeSYS's Scan capabilities and scan for the spot-size. The corresponding BER plots are shown below:



The plot on the left shows simulated link BERs as a function of transmitter-waveguide vertical offset and the one on the right shows BER as a function of the laser output spot size.

As this example demonstrates, the Spatial BeamPROP Interface makes it possible to simulate complex device geometries in the context of a link simulation. Feel free to further experiment with the topology to study the effects of variations in other design parameters, such as waveguide-fiber alignment, receiver sensitivity, etc.