RSoft Design Group produces design software for the telecommunication industry, specifically for optical system simulation and network planning. These advanced tools to enhance and accelerate user modeling capabilities and provide real field design scenarios using extensive industry specifications. Our users include optical component and equipment manufacturers, system integrators, service providers, as well as government labs and academic institutions.

Whether you are interested in maximizing performance, minimizing costs, reducing time-to-market, fast-prototyping, or analyzing multiple what-if scenarios for optical communication networks, these tools will become an inseparable partner and the secret of your success.

RSoft Design Group currently markets four software packages for the simulation, analysis, and planning of telecom systems and networks:

- **OptSim** – Simulates a broad range of optical communication systems
- **ModeSYS** – Simulates multimode optical communication systems
- **MetroWAND** – Models network design, network engineering and network-planning
- **Artifex** – Simulates discrete event networks through the Petri Nets formalism

### Key Features of OptSim
OptSim provides the unique capability of simulating optical systems in both the time and frequency domains. Infinitely long bit sequences as well as Course WDM systems can be simulated with the highest efficiency. More than 600 models are readily available to setup a wide range of optical communication systems, including Nonlinear Fiber, VCSEL laser, SOA, EDFA and Raman amplifier models. New models can be created incorporating, among others, MATLAB, C/C++, Fortran and Java code, allowing legacy code to be reused with minimal effort. An impressive set of validations and an extensive customer base demonstrate the accuracy of OptSim results. OptSim can also be integrated with the RSoft Component Design Suites for a total application solution.

### Key Features of ModeSYS
ModeSYS fully simulates multimode optical systems by taking into account the transverse mode profile propagating through the system. This unique capability ensures a correct signal shape and eye diagram and allows accurate performance estimates to be obtained. The inclusion of spatial effects into multimode models within a system-level simulation framework combines the accuracy of a device level simulation and the efficiency of a system-level simulation. ModeSYS provides, among others, the following key analyses: system bandwidth, launching condition, offset launch, arbitrary index profile, coupling, chromatic and modal dispersion, differential mode delay, and encircled flux.
**Key Features of MetroWAND**

MetroWAND uses high-level models to determine where ring and mesh topologies are most economic, given the network connectivity, traffic demands, and optical equipment constraints. MetroWAND’s automated design approach is useful during both the planning and maintenance aspects of network design. Before a network is physically realized, an optical equipment manufacturer can use MetroWAND to reduce the time needed to create many ‘what-if’ scenarios as a part of a proposed network design solution for RFP and RFQ responses. Vendor’s equipment libraries and design rules can be built into the tool so that the creation and demonstration of viable design scenarios is possible even by a non-specialist. Once a network is in place, MetroWAND can be used by service providers to accomplish their day-to-day network planning activities including network growth studies and network optimization.

**Computer Platforms and System Requirements**

Currently the above System and Network tools are available on a variety of platforms including Windows, Linux and Unix (Sun Solaris) systems. Minimum system requirements for running the software vary depending on the application, but simple, low memory applications can run on a typical desktop computer. For further information on both software and hardware requirements, please contact RSoft Design Group.

For more information beyond this overview, please refer to the individual product sections. Please note that all products are licensed and sold as separate packages.

**Key Features of Artifex**

Artifex provides an innovative modeling and simulation environment for design and optimization issues like protocol dynamics, control mechanisms, switching or recovery mechanisms, optical layer interactions, and logical behavior of network elements such as routers, switches, WDM, optical cross-connects. Artifex is used to design discrete-event systems, with a visual representation of the dynamics. Accurate and self-documented reference models of system dynamics, structure, and data give early feedback to the system engineers, developers, and end users reducing the time to develop the system as well as demonstrate prototypes quickly.
The complexity of designing today’s high-speed optical network is increasing due to the multiple layers, the multiple services and the various protocols and their interaction that must be taken into account. Artifex is a simulation tool for a variety of applications and design needs including optical network protocols, control plane architecture and switching mechanisms.

In order to reduce the user development efforts Artifex has libraries of objects that can be dragged and dropped into the drawing canvas, interconnect them and create system models. An example of such a library is “Networking tool-kit” shipped with Artifex. Networking tool-kit consists of objects representing traffic generators, protocols, optical and non-optical network elements.

**Artifex – as an integrated platform**

As a development platform Artifex consists of a set of tools that are integrated together giving user full freedom and flexibility to model complex systems. These tools support all key activities of the iterative model development cycle.

**Artifex.Model**

Express complex system architectures by drawing and connecting components to define message-flows. Visually describe the dynamic behavior of each component with a high-level Petri Net language that allows inclusion of C/C++ data definitions and algorithms. Radical improvements and changes to models can be made quickly and on a safe ground at each modeling step.

Artifex is a development platform for any discrete event simulations. It uses a graphical modeling and simulation environment to model, design, simulate and analyze discrete event systems. A user can draw the system dynamic behavior through an intuitive graphical language based on the Petri Nets formalism. The software validates the Petri Net model and generates code in C/C++ language. The models can be compiled and run in Artifex environment or compiled and executed as standalone applications.

A simple IP network modeled in Artifex. There are two hosts to ping. Each host is created using the components from the networking tool kit library. The blocks used in this application are:

- a) Ping Application
- b) ICMP protocol
- c) Host - a router
- d) serial interface
- e) a Link to connect both hosts.

Each of these objects are created using Petri Net formalism.

The logical view (mesh) of a WDM Ring and the view of schemes implemented in a ring node. Each node generates packets according to a Poisson process stored in a distinct transmission queue, one associated with each destination/channel. The objective is to study the transmission queue latency time of packets sent to client nodes from client nodes; for example from NODE_2 to NODE_1, NODE_3, NODE_6, NODE_9, NODE_12 and from NODE_9 to NODE_14.
Artifex.Validate
Control full system behavior, by checking the multi-window visual animation of the model and by steering the simulation with conditional breakpoints and step-by-step execution. Sample data for further analysis or inspect and modify it to test alternative scenarios. Unveil logical flaws and eliminate hidden pitfalls.

Artifex.Measure
Review simulation results to get quantitative information on system behavior and to assess its performance. Display pre-calculated or user-defined custom metrics with maximum flexibility. Export recorded data for external tool analysis. Perform coverage analysis to ensure the test has been exhaustive.

Artifex.Report
Add comments anywhere in the model design. Generate automatic on-line HTML documentation to check system behavior, to track changes and to provide consistent report updates throughout the whole design process. Facilitate knowledge flow and exchange as well as design maintenance, thanks to an intuitive understanding of the system behavior.

Artifex includes two additional tools that enable system designers to generate stand-alone software and handle complex data structures.

Artifex.Deploy
Implement simulators, stand-alone or multi-process distributed applications. Map objects on one or more processes and generate software without any additional effort. Exploit automatic inter-process communication management. Use local IPC mechanism to communicate with local processes through TCP, UDP or DCOM. Customize communication layers to generate code compliant with specific requirements like Corba or other IPC protocols.

Artifex.Data
Describe complex system data structures and their relationships with Entity-Relationship diagrams. Define attributes in C/C++ to fully exploit the easy and powerful high-level query language, allowing dynamic data manipulation from any part of the model.

Applications
The Artifex open and flexible modeling approach is utilized in many industries like Transport, Defense, Telecom and Finance. Listed are few applications from Telecom industry.

▼ Model, simulate and analyze networking protocols like TCP, UDP, IP, Ethernet, OSPF, MPLS
▼ Develop, design and validate new and emerging protocols
▼ Conceptualize the complex system behavior, prototyping and develop strategies for its implementation.
▼ Model, simulate and analyze network elements like router, switch, Optical -cross connect (OXC) and Optical Add/drop Multiplexer (OADM) for their logical behavior and protocol implementation.
▼ Model optical control plane and various layer interactions to that as well implementation of algorithms in the control plane.
▼ Validate a source code against an Artifex equivalent model to test as well to investigate for improvements.
▼ Model various traffic generators.
▼ Design and analyze network performance and quality of services (QoS) using the logical models of traffic generators, protocols and network elements.
▼ Design network architectures like ring or mesh, specify network element type optical-access metro or transport and study the network level behaviors like network throughput, blocking probability and assigning wavelengths.
▼ Model buffering, memory and Integrated Circuits (IC)
▼ Develop, validate and analyze protection switching or restoration switching protocols