



TRIANGLE
MICROWORKS, INC.

SOLUTIONS FOR COMMUNICATION PROTOCOL DEVELOPMENT

We support the following industry standard protocols:

DNP3	IEC 61850 Edition 1 & 2
Modbus	7-410 (Hydro)
IEC 60870-5	7-420 (DER)
IEC 60870-6 (TASE.2 / ICCP)	GOOSE
IEC 61400-25 (Wind)	9-2 (Sampled Values)

Communication Protocol Software Libraries

Incorporating our time-tested Software Libraries in your products will reduce development effort and free internal resources to work on company proprietary aspects of your products. Our proven compatibility with existing equipment reduces software development risks.

Available as:

- ANSI Standard C Source Code Libraries
- C++ (IEC 61850/IEC 60870-6 only)
- .NET Communication Protocol Components
- Server Front End Toolkit (no coding, configured by 61850 ICD file)

SCADA Data Gateway

Windows™ application that is also compatible with small embedded industrial hardened PCs

- OPC Client/Server, Data Concentrator, or Protocol Translator
- Bidirectional data translation for monitor and control tags
- Includes protocol analyzer display and event logging
- Data transformation through expressions/equations
- ODBC driver for accessing any DBMS (Database Management System such as SQL & Access)
- OPC Data Access, Alarm and Events, and XML Data Access for interfacing with PC-Based SCADA Systems
- Use our InSight Data Visualization/Graphical Scripting Tool through OPC

Training

Cost-effective, Web-Based Communication Protocol Training with 120-day unlimited access for your entire site

- Pause, rewind, or even replay the entire presentation
- Quizzes and interactive exercises using our test tools reinforce key concepts
- The Table of Contents, search tool, and hyperlinks allow continued use as a reference to quickly research specific issues in the future
- For free introductory videos on communication protocols and our products, visit videos.TriangleMicroWorks.com

All of our products include the first year of the Maintenance and Enhancement Plan, which includes resolution of any questions or compatibility issues that may arise in the field.

If your project needs communication protocol expertise beyond the Maintenance and Enhancement Plan for our products, our Contract Engineering Services are available to assist your Development Team.

Our testing applications include InSight functionality*:

- Create custom graphical displays for Data Visualization and Automation
- Simple DC Power Flow Simulation of Electrical Network
- Design/Debug testing scenarios via JavaScript or a flowchart based Graphical Programming Tool

TESTING TOOLS

61850 Test Suite

The Test Suite is comprised of three applications designed for simulating, testing, and configuring IEC 61850 devices:

- **Hammer** – Client simulator connects to any IEC 61850 Server via SCL file or Discovery. Compare configuration obtained from Discovery to any SCL file.
- **Anvil** – Creates a compliant IEC 61850 Server from any valid SCL file to test IEC 61850 Clients. Data changes can be generated manually, automatically, or driven by table or script
- **SCL Forge** – Intelligent editor for creating and editing Substation Configuration Language (SCL) files.
- Read, Write, GOOSE, Sampled Values, Reporting, Logging, Controls, Dynamic DataSets, SCL Verification, File Services, and a Detailed SCL Consistency Check are supported

Communication Protocol Test Harness

Simulate and test DNP3, IEC 60870-5, and Modbus Devices:

- Simulate Master or Outstation Devices and monitor communications for unidirectional and bidirectional applications
- Create Custom Functional Tests with any .NET programming language, Python, or Tcl/Tk scripts
- Exercise a Device Under Test as it will be used on the network
- Automatically perform conformance test procedures

Iron

Simulate and test IEC 60870-6 (TASE.2/ICCP) devices:

- Create compliant IEC 60870-6 (TASE.2/ICCP) Clients and Servers for unidirectional and bidirectional applications
- Supports Read, Write, Reporting (via DSTransferSets), Controls, and Dynamic DataSets
- Models can be created via .csv files and .xml files

Distributed Test Manager (DTM)

Create, manage, and simulate hundreds of clients and/or servers on a single machine or distributed across a network:

- Load test your device using 100's of simulated clients and/or servers
- Simulate complete substations and systems
- Supports IEC 61850, DNP3, IEC 60870-5, and Modbus
- Supports multiple techniques for simulating data
- Integrates with third party tools like LabVIEW® and MATLAB®

CONFIGURATION TOOLS

DNP3 Forge

Create and edit DNP3 XML Device Profiles:

- Map to IEC 61850 Object Models (included in free version)
- Import/Export Point Lists from/to CSV file format
- Compare supported DNP Data Types against another DNP3 XML Device Profile Document or DNP Subset Level 1,2,3,4 requirements
- Use scripts to validate consistency of related fields and create validation tests to meet specific requirements
- Available soon as a .NET or simplified C Source Code Library for DNP3 XML Device Profile support directly in your product

SCL Forge

Create and edit Substation Configuration Language (SCL) files:

- Presents the SCL file as a coherent Object Model hiding the details of the schema
- Instantly validate SCL files against the schema
- Complete Object Model definition for IEC 61850, IEC 61400-25 (Wind), IEC 61850-7-410 (Hydro), and IEC 61850-7-420 (DER)



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