PRACTICAL TROUBLESHOOTING & PROBLEM SOLVING OF

MODBUS PROTOCOLS

INCLUDING RS-485, RS-232, FIBRE, WIRELESS, ETHERNET & TCP/IP INDUSTRIAL DATA COMMUNICATION SYSTEMS

An intensive, practical, 2-DAY workshop presented by Edwin Wright

Packed with practical sessions our engineers have been working on for months. Real case studies you can immediately apply to your workplace.

OBJECTIVES:

You will:

- **Learn how to identify, prevent and troubleshoot Modbus protocol communications problems**

- **Gain a practical toolkit of skills for working with Modbus**

- **Work competently with Modbus and RS-232/RS-485, Fibre Optics, Wireless and Ethernet**

- **Gain skills to fault find your Modbus based Ethernet, RS-232/RS-485, Wireless, Ethernet & TCP/IP network problems**

WHO SHOULD ATTEND:

Anyone working with or required to troubleshoot industrial communications systems ranging from RS-232 to Fieldbus and Ethernet systems, including:

- Instrumentation & Control Engineers/Technicians
- Process Control Engineers
- Network Planners
- Electrical Engineers
- System Integrators
- Electronic Technicians
- Design Engineers
- Systems Engineers
- Test Engineers
- Designers
- Consulting Engineers
- Plant Managers
- Shift Electricians

EDMONTON, AB
2 & 3 May 2005

WINNIPEG, MB
5 & 6 May 2005

TORONTO, ON
9 & 10 May 2005

MONTREAL, QC
12 & 13 May 2005

FREE REFERENCE MANUAL

NO RISK 100% MONEY BACK GUARANTEE

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IDC TECHNOLOGIES

Technology Training that Works

AUSTRALIA • CANADA
IRELAND • NEW ZEALAND
SINGAPORE • SOUTH AFRICA
UNITED KINGDOM • UNITED STATES

The Workshop

The objective of this workshop is to help delegates identify, prevent and fix common industrial data communications problems focussing on the Modbus protocol. The focus is "outside the box", with the emphasis on practicals that go beyond the typical communications issues and theories. The workshop focus is on providing delegates with the necessary toolkit of skills to solve industrial data communication problems where Modbus is used.

Modbus based industrial communications systems (based on RS-232/RS-485 and Ethernet) are being installed throughout industry today, from connecting simple instruments to Programmable Logic Controllers to the PCs throughout the business part of the enterprise. Communications problems range from simple wiring problems to intermittent transfer of protocol messages.

Whilst the main issues with the Modbus protocol will be covered in this workshop; a clear understanding of the protocols and standards that transport Modbus are required in order to effectively work with Modbus. This includes such standards as RS-485/RS-232 and Ethernet (preferably Industrial Ethernet) and TCP/IP. Modbus, effectively one of the few (arguably, the only) industrial messaging protocols recognized by the Internet world (port 502) has one of the largest installed bases worldwide with more than 7.2 million installed nodes.

The Modbus TCP/IP profile has recently been accepted by the International Electrotechnical Commission (IEC) as a Publicly Available Specification (IEC PAS 62030) and is now eligible to become part of future editions of the International Standards IEC 61158 and IEC 61784-2. So it enjoys the status of a widely available Open Standard available to everyone. And thus the popularity. Whilst detractors will say the Modbus protocol lacks some of the refinements of the newer offerings on the market; there is no doubt that it is one of the most popular standards available in the industrial world.

The communications system on your plant underpins your entire operation. It is critical that you have the knowledge and tools to quickly identify and fix problems as they occur, to ensure you have a secure system. No compromise is possible here. This workshop distills all the tips and tricks learnt with the benefit of many years of experience.

This workshop focuses on the main issues of troubleshooting the industrial data communications network of today, enabling you to walk onto your plant or facility to troubleshoot and fix problems as quickly as possible. The focus of course, is on the Modbus suite of protocols and their associated standards.

Free Reference Manual (Valued at $139.95)

A comprehensive reference manual jam packed with useful information. Comprising over 400 pages it is supplied to every delegate that attends the course.

It is intended to be a useful reference for years to come, it summarizes all the material covered on the workshop plus much, much more.

Your Instructor

Edwin Wright

B.Sc, B.E. (Hons) (Elec). MIPENZ

Edwin has over 20 years of practical experience in the planning, design, construction and operation of telecommunications systems, data networks and SCADA systems. He has also been involved as Project Manager on many SCADA and telecommunications projects and has a passion for the topic.

He is the co-author of three best selling books on Ethernet, OPC, and Computer Networks, the Internet and TCP/IP and the Principles of Data Communications and has also published numerous papers. He has also consulted widely on SCADA, OPC, data communications and telecommunications issues in the USA, Canada, UK, Australia and New Zealand. Over the past eight years more than 12000 engineers and technicians have attended his workshops worldwide.

Delegates attending his course will benefit from his tremendous knowledge and enthusiasm for fieldbus/devicenet and industrial ethernet and his entertaining instructing style. When not working in the communications world he relaxes by reading and writing on technology issues at his beachside home.

Technical Manuals

Leading edge and value for money in:

- ◆ Instrumentation/Automation/Process Control
- ◆ Electrical
- ◆ Industrial IT
- ◆ Mechanical Engineering
- ◆ Industrial Data Communications
- ◆ Electronics
- ◆ Project and Financial Management
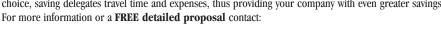- ◆ Civil Engineering

For a comprehensive list, go to **www.idc-online.com/books**

On-Site Training

- • **SAVE MORE THAN 50% OFF the per person cost!**
- • **CUSTOMIZE the training to YOUR WORKPLACE!**
- • **Have the training delivered WHEN AND WHERE you need it!**

All IDC Technologies Training Workshops are available on an on-site basis, presented at the venue of your choice, saving delegates travel time and expenses, thus providing your company with even greater savings. For more information or a **FREE detailed proposal** contact:

☎ **Kevin Baker** on **Toll Free 1800 324 4244** or e-mail: business@idc-online.com

The Program

Day ONE

INTRODUCTION
- Overview of Modbus and development
- How Modbus fits into the RS-232/RS-485/Ethernet and TCP/IP Standards
- List of typical problems

OVERALL METHODOLOGY
- Common symptoms, problems and solutions
- How to quickly identify likely causes
- Overall basic steps
- Communications issues
- Grounding/shielding/noise

BASIC STANDARDS:
- RS-232
  - Fundamentals
  - Problems: cabling, male/female, DTE/DCE, 9-pin, handshaking, voltages, noise, isolation
  - RS-232 Practical Troubleshooting Session
- RS-485
  - Fundamentals
  - Problems: cabling, common mode voltage, converters, isolation, idle state, terminations, control - Hardware/software
  - RS-485 Practical Troubleshooting Session

INDUSTRIAL AUTOMATION STANDARDS:
- Modbus over Serial Communications (such as RS-232/RS-485)
  - Fundamentals
  - Problems: no response, exception reports, noise, radio interfaces, physical and application layers
  - Modbus troubleshooting session
- Modbus Plus
  - Fundamentals
  - Problems: cabling, grounding, shielding, terminators, token passing

Day TWO

INDUSTRIAL ETHERNET
- Fundamentals
- Protocol analysis
- Problems: noise, thin & thick coax and connectors, UTP cabling, wire types, components, incorrect media selection, jabber, too many nodes, excessive broadcasting, bad frames, faulty auto-negotiation, 10/100MBit/s mismatch, full/half duplex mismatch, faulty hubs, switched networks, loading
- Industrial Ethernet Practical Troubleshooting Session

TCP/IP
- Fundamentals
- Software utilities (ping, arp, netstat)
- Protocol analysis
- Problems: internet layer, IP addresses, subnet mask, routers, transport layer, triple handshake, incorrect ports
- TCP/IP Practical Troubleshooting Session

RADIO & WIRELESS COMMUNICATIONS
- Fundamentals
- Problems: reliability, noise, interference, power, distance, licences, frequency, over and under modulation
- Radio & Wireless Practical Troubleshooting Session

MODBUS OVER ETHERNET
- Modbus over TCP/IP
- Modbus-IDA Packet structure
- Typical troubleshooting issues
- Practical session with Modbus over TCP/IP

TROUBLESHOOTING TIPS AND TRICKS
- Summary of all the problems faced
- Further troubleshooting tips

The fee for each workshop covers all materials including your **workshop manual, lunches** *and* **refreshments**

Practical Sessions

12

- Set up of simple Modbus master-slave network using RS-232 and RS-485
- Investigation of all the Modbus Protocol packets using Protocol analyzer
- Fault finding the RS-232/RS-485 physical layer Modbus problems
- Typical problems with Modbus serial communications
- Configuration of an Ethernet Network

- Configuration of a simple Network Protocol
- Demonstration of typical failure points
- Diagnosis of Network Hardware problems
- Addition of TCP/IP Protocol
- Use of basic utilities for troubleshooting
- Demonstration of Modbus over TCP/IP and Ethernet
- Simple fault finding of Modbus over TCP/IP

REGISTRATION FORM

Practical Troubleshooting and Problem Solving of
Modbus Protocols

1. DELEGATE DETAILS

CONTACT: _____

COMPANY NAME: _____

COMPANY ADDRESS: _____

SUBURB: _____ PROVINCE: _____ POSTAL CODE: _____

PHONE: ( ) _____ FAX: ( ) _____

E-MAIL: _____

ATTENDEES:

MR/MS: _____ JOB TITLE: _____

MR/MS: _____ JOB TITLE: _____

MR/MS: _____ JOB TITLE: _____

AREAS OF INTEREST (please check)

☐ Data Communications & Networking ☐ Electrical ☐ Electronics

☐ Instrumentation, Automation & Process Control ☐ Information Technology ☐ Project & Financial Management

☐ Mechanical Engineering ☐ Chemical Engineering ☐ Civil Engineering

Should you have more people interested in attending this workshop, please contact us on
Toll Free 1800 324 4244 or e-mail: register@idc-online.com

2. WORKSHOP DETAILS

YES, I (WE) WOULD LIKE TO ATTEND THIS WORKSHOP: (Please check the relevant box)

☐	**EDMONTON, AB**	on	2 & 3 May 2005	at	Sparton Controls
☐	**WINNIPEG, MB**	on	5 & 6 May 2005	at	TBA
☐	**TORONTO, ON**	on	9 & 10 May 2005	at	Holiday Inn Toronto Airport
☐	**MONTREAL, QC**	on	12 & 13 May 2005	at	Holiday Inn Montreal Airport

3. PAYMENT DETAILS

PLEASE NOTE: Prices shown are EXCLUSIVE of GST or HST

☐ **WORKSHOP FEE** $1090.00 x _____ delegates = $ _____

☐ **EARLY BIRD BOOKING DISCOUNT** (If booking **on or before** 15 April 2005)

~~$1090.00~~ $1035.00 = $ _____

+ 7% GST (or 15% HST) = $ _____

TOTAL DUE = $ _____

I wish to pay by: ☐ **CHEQUE,** made payable to **IDC Technologies**

☐ **COMPANY ORDER NUMBER:** _____

Please charge my:

☐ MASTERCARD ☐ VISA ☐ AMEX ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

CARDHOLDER'S NAME: _____ CARDHOLDER'S SIGNATURE: _____ EXPIRY DATE: ___ / ___

Please Note: Full payment is required prior to the commencement of the workshop.

4. ON-SITE TRAINING & CONSULTATION

YES, I would like to find out more about **IDC Technologies** on-site training and consultation services:

☐ Practical Troubleshooting and Problem Solving of Modbus Protocols

☐ Other IDC Technologies workshops ☐ IDC Engineering Consultancy Services

5. MORE INFORMATION

☐ I am unable to attend this workshop but please rush me an IDC Technologies workshop directory.

BOOKING CODE: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

WORKSHOP DETAILS

- Workshops start at 8:30am and finish at 5:00pm daily.

- Registration is from 8:00am on the first day.

- The workshop fees are per delegate and include a reference manual, handouts, lunches and all refreshments.

- Full payment is required prior to the commencement of the workshop.

EARLY BIRD BOOKING DISCOUNT*

Please note that the Early Bird Booking Discount is only available to those registrations received by **15 April 2005** and paid prior to the commencement of the workshop.

* This offer cannot be used in conjunction with any other discount or offer.

CANCELLATION

A fee of 20% will apply for written cancellations received 7-14 days prior to the commencement of the workshop.

Cancellations received less than 7 days prior to the workshop are not refundable however substitutes are welcome.

CONFIRMATION

Full confirmation details and workshop instructions will be sent to you upon receipt of booking.

PLEASE NOTE

Venues to be confirmed upon registration. Instructors may change without notice.

IDC Technologies has no affiliation with suppliers or manufacturers and therefore presents a completely unbiased factual view of the industry.

PRIVACY INFORMATION

If your address details are incorrect, or you wish to remove your name from our mailing list, please contact us by phone, fax or e-mail (see below).

At times we make use of lists that cannot be cross-checked against our own database and you may receive a duplicate. If so, please pass this on to an interested colleague.

HOW TO REGISTER

1. By Phone:
Toll Free 1800 324 4244

2. By Fax:
Toll Free 1800 434 4045

3. By Mail:
IDC Technologies
Suite 402, 814 Richards Street
Vancouver BC V6B 3A7

4. By E-mail:
idc@idc-online.com

5. Via our Web Site:
www.idc-online.com