

DCI Technologies Inc.

www.dcitech.com

OPC DIAGNOSTICS SERVER

TECHNICAL MANUAL

INTEGRA OPC PROTOCOL

Document No: DCI-OPCTR01

Revision 1.01

Creation Date: October 18, 2000

Revision Date: May 11, 2001

REVISION NOTES

Revision History:

Rev. No.	Description	Date	By
1.0	Created – First Draft	18-Oct-00	W.E.(Ted) Skinner
1.01	Updated document formatting	11-May-01	W.E.(Ted) Skinner

Revision Notes:

APPROVALS

_____	_____	Date
_____	_____	Date
_____	_____	Date

TABLE OF CONTENTS

1. OPC Server Installation.....	1-1
1.1 <i>Installing the OPC Server</i>	<i>1-1</i>
1.2 <i>Getting Started with the OPC Server.....</i>	<i>1-1</i>
1.2.1 <i>Configure your Radio Addressing.....</i>	<i>1-1</i>
1.2.2 <i>Connect your Radio to the OPC Server</i>	<i>1-1</i>
1.2.3 <i>Start up the OPC Server</i>	<i>1-1</i>
1.3 <i>Connecting your host to the OPC Server.....</i>	<i>1-2</i>
1.3.1 <i>Browsing for Data via OPC</i>	<i>1-2</i>
1.3.2 <i>Connect to EXCEL.....</i>	<i>1-3</i>
1.4 <i>Configuring Multiple Device Connections.....</i>	<i>1-3</i>
1.4.1 <i>Define Topics</i>	<i>1-3</i>
1.4.2 <i>Select Protocol and Configure Device Connections</i>	<i>1-4</i>
1.4.2.1 <i>Protocol Selection</i>	<i>1-4</i>
1.4.2.2 <i>Com Port</i>	<i>1-5</i>
1.4.2.3 <i>TCP/IP Socket.....</i>	<i>1-6</i>
2. DATARADIO Integra -TR.....	2-1
2.1 <i>Description of DATARADIO Integra-TR Diagnostics.....</i>	<i>2-1</i>
2.1.1 <i>OPC and DDE Diagnostics</i>	<i>2-1</i>
2.2 <i>Operating Systems.....</i>	<i>2-2</i>
2.3 <i>Application Interface.....</i>	<i>2-2</i>
2.4 <i>Computer Interface</i>	<i>2-2</i>
2.5 <i>Partial List of Supported Clients.....</i>	<i>2-3</i>
3. System Overview.....	3-1
3.1 <i>Technical Support</i>	<i>3-1</i>
3.1.1 <i>Email</i>	<i>3-1</i>
3.1.2 <i>Web</i>	<i>3-1</i>
3.1.3 <i>Resellers</i>	<i>3-1</i>
3.1.4 <i>Telephone</i>	<i>3-2</i>
4. Warranty and Limited Liability	4-1

1. OPC Server Installation

1.1 Installing the OPC Server

Installing the DATARADIO OPC Server is a two step process.

First, the main OPC server is installed from the Descartes CD Rom. You will need to install this prior to implementing anything else.

The second step is to install the DATARADIO specific Protocol Files from the DCI Technologies Floppy Disk. The program you need to run the installation is called SETUP.EXE on both the CD and the Floppy. Just follow the on screen instructions.

1.2 Getting Started with the OPC Server

1.2.1 Configure your Radio Addressing

The Integra Radio's have a short ID number that is configurable; this number can range from 1 to 254. Each radio in a particular cell must have a unique Short ID if you want to effectively utilize the diagnostics capability. To get started make sure that you have your test radios configured for a short ID of 100 and 101. Refer to the DATARADIO INTEGRA Service manual for details on how to do this.

1.2.2 Connect your Radio to the OPC Server

Using a straight through serial cable (DB9F to DB9M) connect the "SETUP" port of one Integra to the COM 1 port on the computer that has the OPC server installed. If COM 1 is not available, then you will need to refer to the section *Configuring Multiple Device Connections* in order to redirect the connection to the appropriate COM port or TCP/IP socket on a terminal server.

1.2.3 Start up the OPC Server

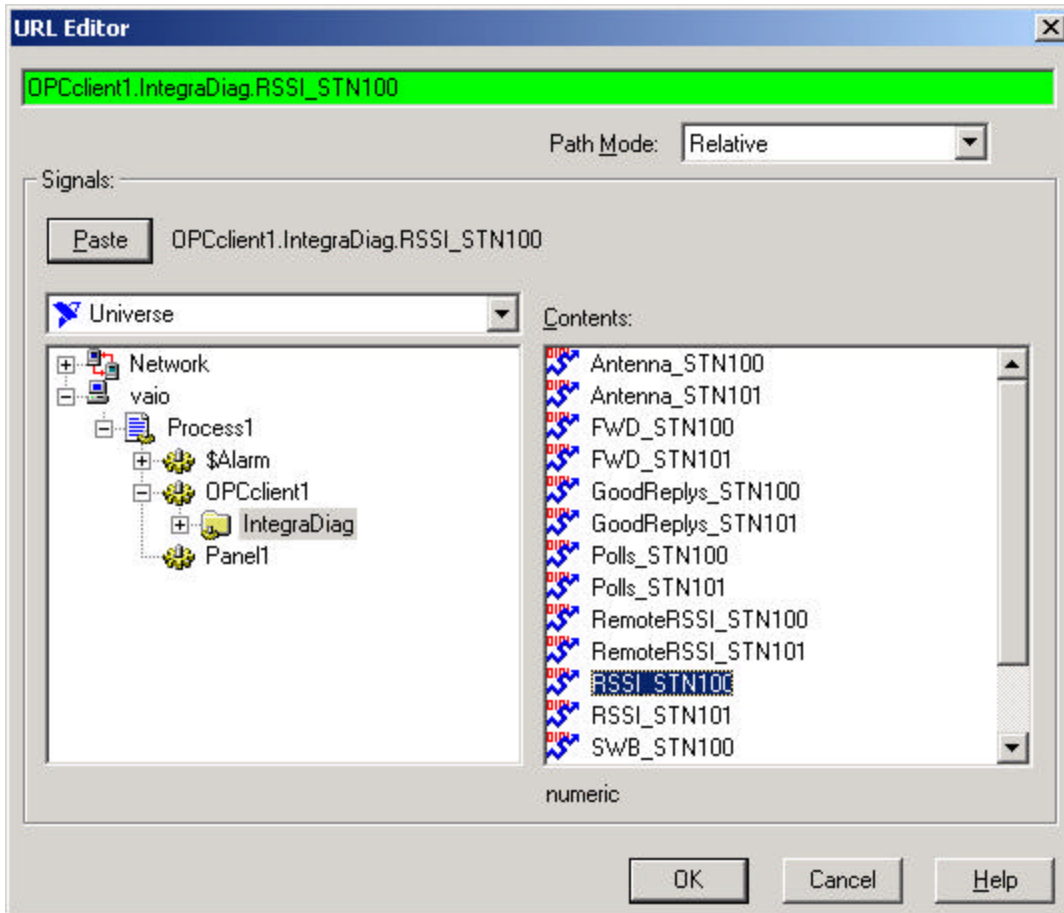
Using the Windows "START" Menu look under "PROGRAMS", then DSSI, then select OMNISERVER. This will start up the OPC server and present a blank screen. All you need to do is minimize the screen. At this point the OPC server is up and running and awaiting data requests. You can also put a shortcut to "C:\OMNISRV\OMNISRV.EXE" in your windows start-up group to have the OPC server start-up each time windows is started.

1.3 Connecting your host to the OPC Server

1.3.1 Browsing for Data via OPC

The OPC server is browsable, so it is very easy to select the diagnostics data points you want to monitor.

For example the following is a screenshot from National Instruments LookOut when browsing for an Integra Diagnostics Datapoint.



In this case the highlighted data point is the Receive Signal Strength Indicator for the Radio with a short ID of 100. The listings in most OPC Client Browsers are presented in alphabetical order so common data types are grouped together. The Radio Short ID is the last three digits in the datapoint name.

1.3.2 Connect to EXCEL

An easy way to test if things are working correctly is to use the demo Excel spreadsheet program that was provided on the DCI Technologies Installation Floppy. These files are installed during the installation process. A sample program has been included to enable you to get some data back into Excel from the OPC server. Using the Windows “Start” Menu look under “PROGRAMS”, then DATARADIO, then select “START INTEGRA OPC DDE DEMO”. This will automatically start the OPC server and start Excel with the proper spreadsheet.

1.4 Configuring Multiple Device Connections

1.4.1 Define Topics

A topic in the OPC Server is used by client applications to identify groupings of diagnostics data. In the previous screenshot the Topic Name would be “IntegraDiag”. This is the default name that the OPC server uses for the Integra Diagnostics. You can see it listed under the “OPClient1” object in the left pane of the previous window.

If you are running multiple radio hub sites and want to gather diagnostics data from more than one hub you will need to create a new topic for each one. This is done by stopping the OPC server (click the red traffic light) and then from the menu select “Configure” and click on “Topics”. You will then be presented with a list of current “Topics” and you can choose to modify or create a new one. Once you have made your selection the Topic Definition Dialog will allow the specification of a topic.

Topic Definition

Application Name OMNISRV

Topic Name IntegraDiag

Description Dataradio Integra Diagnostics

Update Interval 1000 Milliseconds

Write Delay 10 Milliseconds

Topic Variable STN

Protocol INTEGRA

Devices COM1

OK

Cancel

Protocol

Devices

Advanced >>

Help

The **Topic Name** is the topic name used by client applications. This is the field that would be modified if you were using multiple communications lines. Create a new topic for each communications line or base station that you need to connect to.

The **Description** field provides a comment for documentation purposes. It has no impact on how the OPC Server operates.

The **Update Interval** is the number of milliseconds between the times that The OPC Server polls for data from a device for a topic. This is pertinent only for topics with protocols with read messages. If the amount of time required to read data from all topics on a device exceeds a topic's update interval, The OPC Server immediately restarts its polling of the topic. If the amount of time is less than the update interval, the OPC Server delays polling the topic for an appropriate period of time. This field is not used in the Integra Diagnostics so leaving it set to 1000 is fine.

The **Write Delay** is the number of milliseconds that the OPC Server waits before sending a message to a device. This is useful if a device needs a "rest period" between transmissions. For the Integra a delay of 0, or no milliseconds is sufficient.

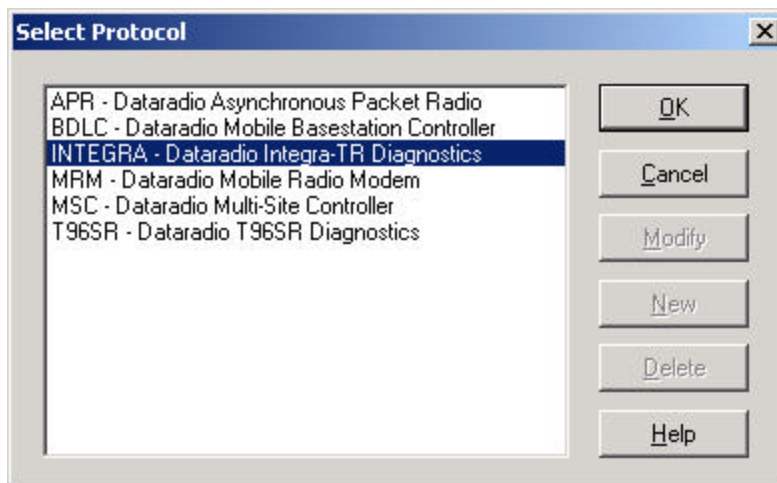
The **Topic Variable** is an optional value, such as a station address, assigned to the topic. Its value depends on the assigned protocol. The topic variable is used to populate and verify the topic variable sequence in a message. The Integra protocol does not require the topic variable, you can leave this field blank.

1.4.2 Select Protocol and Configure Device Connections

1.4.2.1 Protocol Selection

The **Protocol** and **Devices** buttons show the currently assigned protocol and devices for the specific Topic you have selected. The corresponding buttons assign the protocol and devices to the topic with the Select Protocol and Select Devices dialogs. In both cases, The OPC Server presents a list of choices. You can choose only one protocol. Click on "INTEGRA" for the DATARADIO Integra family of radio modems.

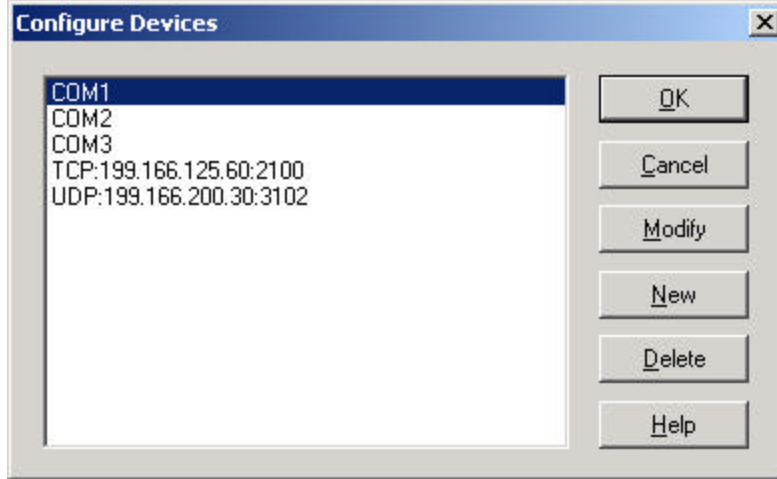
The "protocol" button will display the following screen



You can only select one protocol per Topic.

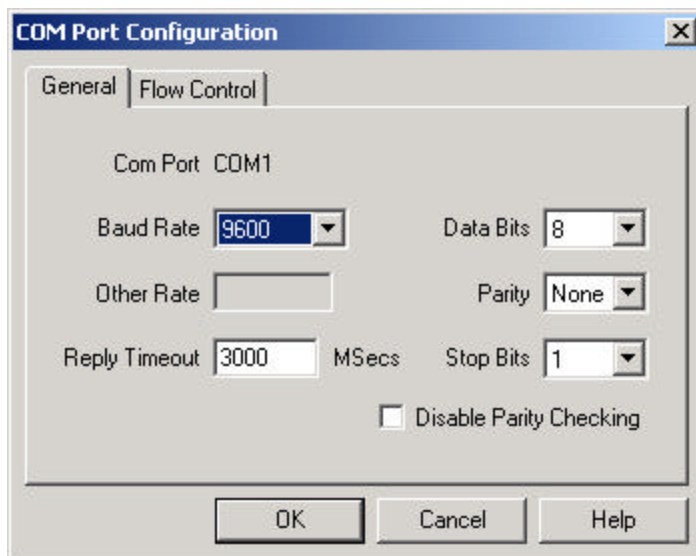
1.4.2.2 Com Port

The “Devices” button will display the following screen:



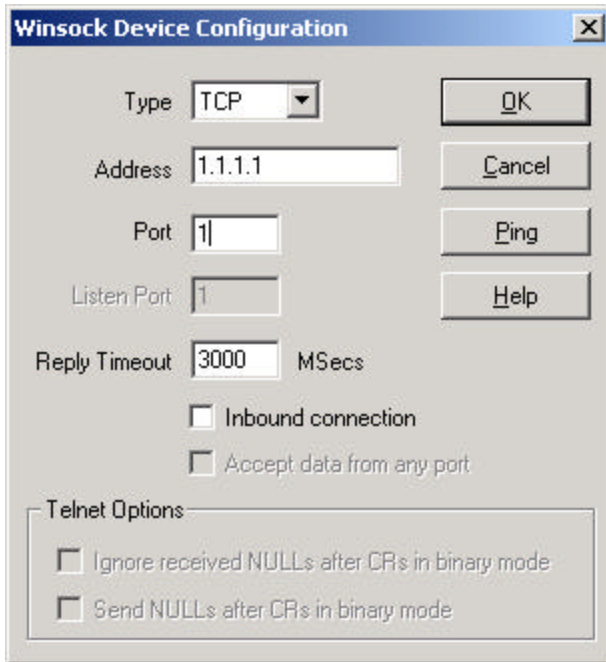
You can specify multiple devices for a given protocol. If the OPC Server cannot establish communication on one device, it tries the other devices. This allows the use of redundant communication lines. This feature is not available with the unsolicited diagnostics mode of the Integra. If you require this feature implemented for your application you will need to contact DCI Technologies Inc. and arrange for a customized protocol stack and utilize the Integra Radio’s DMP Protocol Capability.

The Com Port Configuration dialog shows the setting of the currently selected Com Port. The settings for the Integra Diagnostics is 9600 Baud, 8 data bits, No parity and 1 stop bit as shown in the following screen shot. Flow control should be set to none.



1.4.2.3 TCP/IP Socket

The Winsock Device Configuration dialog shows the selected TCP/IP connection.



Type specifies the TCP/IP protocol to use. This must match the protocol used by the target device. The choices are UDP, TCP, and TELNET.

Address is the network address of the device. The address may either be the TCP/IP dot address, such as 100.101.102.103, or a host name, as defined by the localhosts file or DNS. The OPC Server validates the address at runtime. You can also validate the address using the Ping button.

Port is the TCP/IP port number of the software in the network device. This port number identifies a software service to TCP/IP. The OPC Server communicates with this software agent in the network device. If Inbound connection is not checked, you must enter that software's port number in this field. If Accept data from any port is checked, this field is disabled.

Listen Port identifies the OPC Server's TCP/IP port number. This is required for when using the UDP protocol or for inbound TCP and TELNET connections. Different Winsock devices can use the same listen port. The OPC Server checks where a message came from to determine which device actually sent it. See *Accept data from any port* for details.

Reply Timeout is the amount of time that the OPC Server waits for a reply to a message it has sent a device. This time is in milliseconds. If no response is received within the timeout period, The OPC Server retransmits its message. If another timeout occurs, The OPC Server tries for a third a final time. If there is no response to the third message, The OPC Server declares a communication failure for the device.

Inbound connection, which is active only for TCP or TELNET connections, specifies if the OPC Server or the network device is to initiate the TCP or TELNET connection. If

cleared, the OPC Server starts the connection. If set, the network device establishes the connection.

Accept data from any port, which is active only for UDP connections, specifies if the OPC Server should accept any message sent to the Listen Port or if the message should be validated against the sending Port number. Checking this box allows the OPC Server to accept any message.

For **TELNET** connections, there are two additional options. These deal with the placing of NULL characters (hexadecimal 00) after carriage returns (hexadecimal 0D). Some TELNET devices place a NULL after a carriage return in binary mode even though the TELNET protocol does not specify this. The first option, Ignore received NULLs after CRs in binary mode, causes The OPC Server to strip all NULLs after carriage returns sent by a TELNET device. The second option, Send NULLs after CRs in binary mode, causes The OPC Server to insert NULLs after any carriage returns it sends to a TELNET device. Usually, you will set both options the same. It is not recommended to use a Telnet connection when connecting to the Integra Setup Port.

2. DATARADIO Integra-TR

2.1 Description of DATARADIO Integra-TR Diagnostics

The diagnostic feature of the Integra provides all the information required to monitor and maintain your communications link. Information such as power, temperature, voltage, signal strength, antenna/feedline condition, and data decode performance is transmitted online with no application interruption and provided continuously at a dedicated diagnostics/set-up port separate from the “Data” port.

2.1.1 OPC and DDE Diagnostics

The Integra-TR OPC Server provides the individual status of network radio modems while the application is running. The diagnostic information is gathered with each transmission and made available to client applications as outlined in the following table.

		OPC Data Member Server Name is DSSI.OmniOPCServer.1	DDE Syntax Excel Syntax is used for the examples
Parameter	Description	xxx indicates Radio Short ID Number	
Temp	Temperature in degrees Celsius inside the remote unit's case.	IntegraDiag.Temp_STNxxx	Omnisrv IntegraDiag!Temp_STNxxx
SWB+	Supply voltage to remote unit displayed in tenths of a volt. Indication of battery integrity.	IntegraDiag.SWB_STNxxx	Omnisrv IntegraDiag!SWB_STNxxx
RSSI	(Receive Signal Strength Indicator) Indicates how well the local station receives the remote unit's transmission in dBm.	IntegraDiag.RSSI_STNxxx	Omnisrv IntegraDiag!RSSI_STNxxx
Remote RSSI	(Remote Receive Signal Strength Indicator) Indicates how well the remote unit receives the local station's transmission in dBm	IntegraDiag.RemoteRSSI_STNxxx	Omnisrv IntegraDiag!RemoteRSSI_STNxxx
Fwd	Forward power of remote unit displayed in tenths of a watt. Indicates transmitter integrity.	IntegraDiag.FWD_STNxxx	Omnisrv IntegraDiag!FWD_STNxxx
Rev	Reverse power of remote unit. Indicates antenna and feedline integrity.	IntegraDiag.Antenna_STNxxx	Omnisrv IntegraDiag!Antenna_STNxxx
Good	Number of good data blocks received in the last 15 blocks sent.	IntegraDiag.GoodReplies_STNxxx	Omnisrv IntegraDiag!GOODREPLYS_STNxxx
Total	Number of total data blocks received. Maximum of 15 blocks.	IntegraDiag.Polls_STNxxx	Omnisrv IntegraDiag!POLLS_STNxxx

2.2 Operating Systems

- Microsoft Windows 95/98 , Windows NT 4.0 and Windows 2000
- The OPC Server is a true 32-bit program that realizes improved performance under Microsoft's 32-bit operating systems

2.3 Application Interface

The OPC Server supports a wide range of clients. It can even support multiple clients using different interfaces at the same time.

- **Supports OPC** – OLE for Process Control. The data exchange standard supported by all major industrial software providers.
- **Supports DDE** – Supported by almost all windows applications for exchanging data with other programs.
- **FastDDE** – An enhanced version of DDE for improved performance with Wonderware's InTouch and FactorySuite Products.
- **AdvanceDDE** – Also an enhanced version of DDE for improved performance with Rockwell Software's RSVIEW and GE Fanuc's CIMPLICITY packages.
- **FIX Driver** – Uses the I/O driver toolkit to exchange data with FIX and other Intellution products. Support for Intellution's FIX DMACS is also available.

2.4 Computer Interface

- **Serial.** Communicate to any device connected to your computer via a COM port. Using either standard or specialized serial cards the OPC server can communicate using RS-232, RS-422 or RS-485
- **TCP/IP.** Communicate to TCP, UDP and Telnet based devices. Provide the capability to communicate to your radio over a LAN using terminal servers.
- **LPT.** Send data to a printer, print event logs etc.
- **Radio.** Communicate to remote devices using the built in support for RTS keyed radio communications. (Developer Version)
- **Modems.** Configure a protocol to communicate to remote devices using a modem or X.25 networks. (Developer Version).
- **GPIB.** Supports National Instruments GPIB (GPIB card required).

2.5 Partial List of Supported Clients

- National Instruments LookOut and Bridgeview
- US Data FactoryLink
- Wonderware Intouch and FactorySuite
- Intellution iFIX and FIX32
- Rockwell Software RS-View
- Citect
- GE-Fanuc CIMPLICITY
- Microsoft Excel, Word, Access and VB

3. System Overview

Easy to use. The OPC Server uses only dialogs so you can use it yourself. You no longer need the specialists required for other OPC servers.

Single interface. You now can focus all your attention on your I/O devices instead of learning the client application interface. The OPC Server is capable of being the single server for a variety of different client applications.

Simplifies Tasks. Many toolkits require you to handle the background tasks for scheduling and data storage. The OPC server does all this for you plus it is a browsable server so you can concentrate on what you want to do with the data instead of the protocol itself.

Runtime and Developer Versions. You can choose your level of involvement from purchasing a bundled runtime system for the Integra-TR or T96-SR radios right up to a full developer version that allows you to completely modify decoding schemes and data members.

DCI also provides programming support, including custom error detection schemes and interfaces to other communication devices and client applications. Contact us for details.

3.1 Technical Support

At DCI Technologies, we are working hard to provide you with intuitive technical products. However, should you find yourself with a technical question that you can not answer with the provided tools, please contact our Technical Support Department. We are eager to answer your questions and help get your system running the best way possible.

3.1.1 Email

Ask questions and receive detailed answers from Technical Support by sending an email message to the account listed below. You must include your product model and serial number in your email message. You will receive a reply by email.

Email to: TechSupport@dcitech.com

3.1.2 Web

Stay informed about the latest information by checking out DCI Technologies Web site

Internet Web Page: <http://www.dcitech.com>

3.1.3 Resellers

Contact your local reseller who should be able to help you with your questions. For information on re-sellers in your area please email us:

Reseller Information: Sales@dcitech.com

3.1.4 Telephone

You can reach DCI Technologies Inc. by phone between 8:00 AM and 4:00 PM Mountain Standard Time, Monday through Friday excluding Canadian Statutory Holidays. When you call, please be prepared to provide the following information:

- Product serial number used for registration
- Product name and version number
- Type of computer hardware you are using
- Software version number of Windows

DCI Technologies Technical Support: 1-403-720-4885

Regular Mail:

DCI Technologies Inc.
Box 11, Site 12, RR 5
Calgary, AB T2P 2G6
Canada

4. Warranty and Limited Liability

OPC SERVER SOFTWARE LICENSE AGREEMENT

DCI TECHNOLOGIES INC. (“LICENSOR”) IS WILLING TO LICENSE THE ENCLOSED SOFTWARE TO YOU (“CUSTOMER”) ONLY IF YOU ACCEPT ALL OF THE TERMS AND CONDITIONS OF THIS SOFTWARE LICENSE AGREEMENT.

IF YOU DO NOT AGREE TO THESE TERMS AND CONDITIONS, LICENSOR WILL NOT LICENSE THIS SOFTWARE TO YOU, AND IN THAT CASE YOU SHOULD RETURN THIS PRODUCT PROMPTLY, INCLUDING THE PACKAGING, THE DISK AND PACKAGE, AND ALL WRITTEN MATERIALS TO THE PLACE OF PURCHASE FOR A FULL REFUND.

License

1. Licensor hereby grants and Customer hereby accepts a non-exclusive, non-transferable license (the “License”) to use this copy of the enclosed software at one computer workstation at any one time upon the terms and conditions set forth in this agreement.

Customer may copy the enclosed software for archival or backup purposes. An additional license is required for use of the enclosed software other than as set out herein.

Customer agrees not to modify, merge, reverse engineer, reverse compile, or disassemble the enclosed software, or portions thereof, in any manner whatsoever. Upon modification, merging, reverse engineering, reverse compiling, or disassembling of the enclosed software, or portions thereof, the License is automatically terminated.

Term

2. The License is effective upon acceptance by Customer, and shall remain in effect until terminated as provided herein. The License may be terminated by Customer at any time upon written notice to Licensor. Licensor may terminate the License if Customer fails to comply with any term or condition in this agreement.

Upon termination by either party, Customer shall return to Licensor, or destroy, the enclosed software and all associated documentation with all copies in any form.

Limited Warranty

3. Licensor warrants that the Enclosed software will perform substantially in accordance with the accompanying written documentation for a period of 90 days from the date of Customer’s receipt of the enclosed software.

Warranty Disclaimer

4. THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, MERCHANTABILITY QUALITY, DURABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND INFRINGEMENT AND THOSE ARISING BY STATUTE OR OTHERWISE IN LAW OR FROM THE COURSE OF DEALING OR USAGE OF TRADE. LICENSOR DOES NOT WARRANT THAT THE ENCLOSED SOFTWARE WILL MEET ANY OR ALL OF CUSTOMER'S PARTICULAR REQUIREMENTS, THAT THE ENCLOSED SOFTWARE WILL OPERATE ERROR-FREE OR UNINTERRUPTED OR THAT ALL PROGRAMMING ERRORS IN THE ENCLOSED SOFTWARE CAN BE FOUND IN ORDER TO BE CORRECTED.

LICENSOR'S RESPONSIBILITY TO REPLACE THE DEFECTIVE ENCLOSED SOFTWARE, OR REFUND CUSTOMER'S PAYMENT IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO CUSTOMER FOR BREACH OF THIS WARRANTY.

Limitation of Liability

5. IN NO EVENT SHALL LICENSOR BE LIABLE UNDER ANY THEORY OF CONTRACT (EVEN IF IN THE NATURE OF A BREACH OF A CONDITION OR A FUNDAMENTAL TERM OR A FUNDAMENTAL BREACH), TORT, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY, INCLUDING NEGLIGENCE, OR MISREPRESENTATION OR ALLEGED INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF THIRD PARTIES, FOR ANY DAMAGES, INCLUDING DIRECT, INDIRECT, SPECIAL, INCIDENTAL, AND CONSEQUENTIAL DAMAGES, EVEN IF CUSTOMER OR SUPPLIER HAS BEEN ADVISED OF THE POSSIBILITY THEREOF INCLUDING LOSS OF DATA, LOSS OF BUSINESS, DOWN-TIME OR FAILURE TO REALIZE EXPECTED PROFITS OR SAVINGS OR OTHER ECONOMIC OR COMMERCIAL LOSS OF ANY KIND OR FOR ANY CLAIM AGAINST USER BY ANY OTHER PARTY, ARISING IN ANY WAY FROM THIS AGREEMENT OR THE ENCLOSED SOFTWARE, ALL OF WHICH LIABILITY IS HEREBY EXPRESSLY WAIVED.

CUSTOMER ACKNOWLEDGES AND AGREES THAT THE WARRANTY DISCLAIMER AND LIMITATION OF LIABILITY PROVISIONS CONTAINED HEREIN ARE REASONABLE GIVEN THAT, AMONG OTHER REASONS, THE ENCLOSED SOFTWARE HAS A RELATIVELY LOW COST.

General

6. This Agreement, the License and accompanying documentation, or any part thereof, may not be assigned or transferred by Customer without the prior written consent of Licensor.

7. This Agreement shall be governed by the laws in force in the Province of Alberta, in the country of Canada. NO ACTION AGAINST LICENSOR OR ANY OF ITS DIRECTORS, OFFICERS, EMPLOYEES OR SHAREHOLDERS, REGARDLESS OF FORM (INCLUDING NEGLIGENCE), ARISING OUT OF ANY CLAIMED BREACH OF THIS AGREEMENT OR TRANSACTIONS UNDER THIS AGREEMENT OR IN ANY OTHER WAY RELATED TO THIS AGREEMENT MAY BE BROUGHT BY CUSTOMER MORE THAN ONE YEAR AFTER THE CAUSE OF ACTION HAS ACCRUED.

8. This Agreement contains the entire agreement between the parties with respect to the use, reproduction, and transfer of the enclosed software.

9. The warranty disclaimer, limitation of liability, and limitation period provisions contained herein shall remain in force and effect after the termination of this Agreement.

10. All questions regarding this Agreement or the license granted herein should be directed to Licensor's offices at:

DCI Technologies Inc.
PO Box 11, Site 12, RR 5
Calgary, AB T2P 2G6 Canada
Ph: 403 720 4885 Fax: 403 720 3905
Email: connected@dcitech.com
WEB: <http://www.dcitech.com>