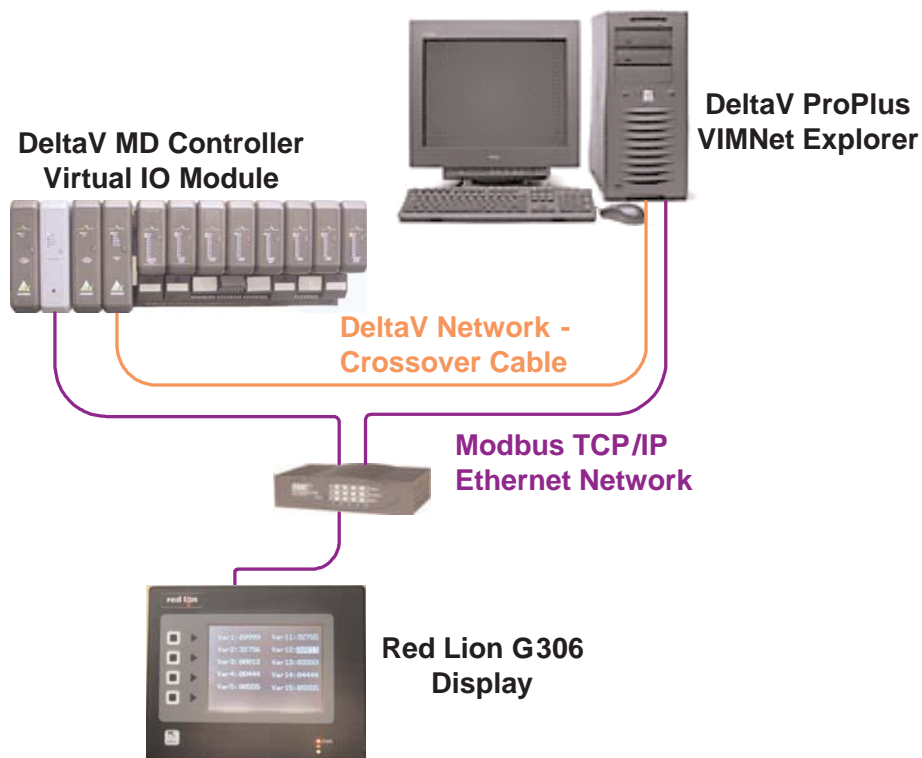




Introduction

The purpose of this white paper is to document the testing of a Modbus TCP/IP device with the DeltaV Virtual IO Module and the Modbus TCP/IP Driver. The testing was completed in MYNAH Technologies testing lab in Chesterfield, MO, USA. The following was tested and documented:

- Third Party Device configuration and setup.
- Virtual IO Module configuration and setup.
- DeltaV configuration and setup.
- DeltaV control performance testing and performance indicators noted.
- Testing notes, observations, and comments.



Testing system layout and architecture.



M Y N A H

Third Party Device Configuration and Setup

Device Tested: Red Lion G360 HMI Display, SN 0005E40011E0

The unit was shipped to MYNAH from Tetra Systems in Phoenix, Arizona. The items received at MYNAH and used in the test included the following components:

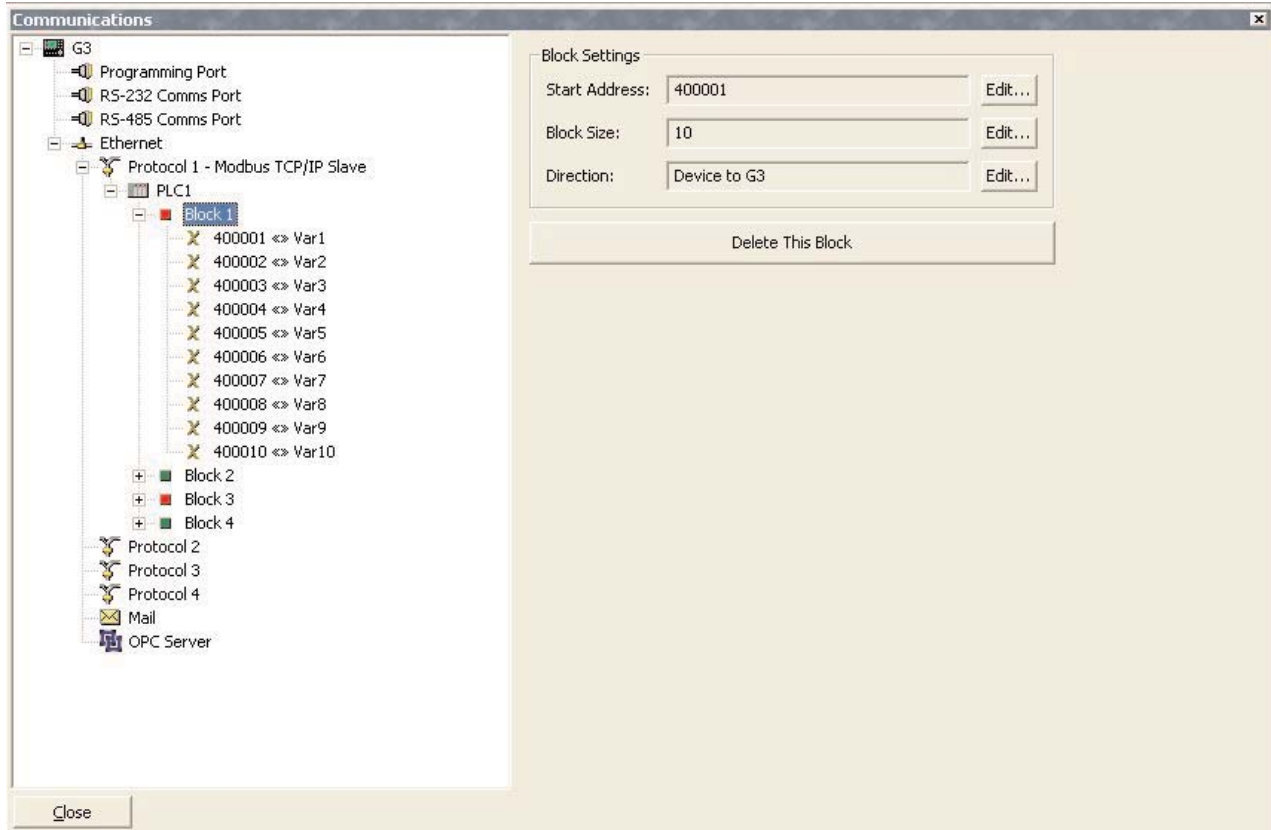
- Red Lion Model G360 Display
- Red Lion Crimson 2.0 Build 197 Configuration Software
- ICP DAS Model NS-205 5-Port Industrial Ethernet Switch
- Phoenix Contact Model MINI-PS-100-240AC/24VDC/2 Power Supply

Port Mode	Manual Configuration)
IP Address	10.12.1.10
Subnet	255.255.252.0
Gateway	0.0.0.0
IP Routing	Disabled
Enable Full Duplex	No
Enable High Speed	No
Remote Update/IP Download	Disabled
Driver Selection	Modbus TCP/IP Slave
TCP Port	502
Session Limit	2
Server Access	Do Not Restrict

The G306 display was configured using the Crimson Software 2.0 Build 197. The communications settings for the display under G3/Ethernet were as shown the the table on the left.

In order to talk to DeltaV, Device PLC1 was Enabled and four Gateway Blocks were configured. Twenty integer tags (VAR1 to VAR20) and twenty Boolean Flags (VAR21 to VAR40) were defined under the Data Tags section of the Crimson 2.0 configuration software. These tags were assigned to the values in the gateway blocks. To follow is the configuration of the four Gateway Blocks:

Block 1		Block 3	
Modbus Type	Holding Register (4)	Modbus Type	Digital Coils (0)
Start Address	400001	Start Address	000001
No Values	10	No Values	10
Direction	Device to G3	Direction	Device to G3
Mapped Variables	Var1 to Var10	Mapped Variables	Var 21 to Var30
Block 2		Block 4	
Modbus Type	Analog Inputs (3)	Modbus Type	Digital Inputs (1)
Start Address	300001	Start Address	100001
No Values	10	No Values	10
Direction	G3 to Device	Direction	G3 to Device
Mapped Variables	Var11 to Var20	Mapped Variables	Var 31 to Var40

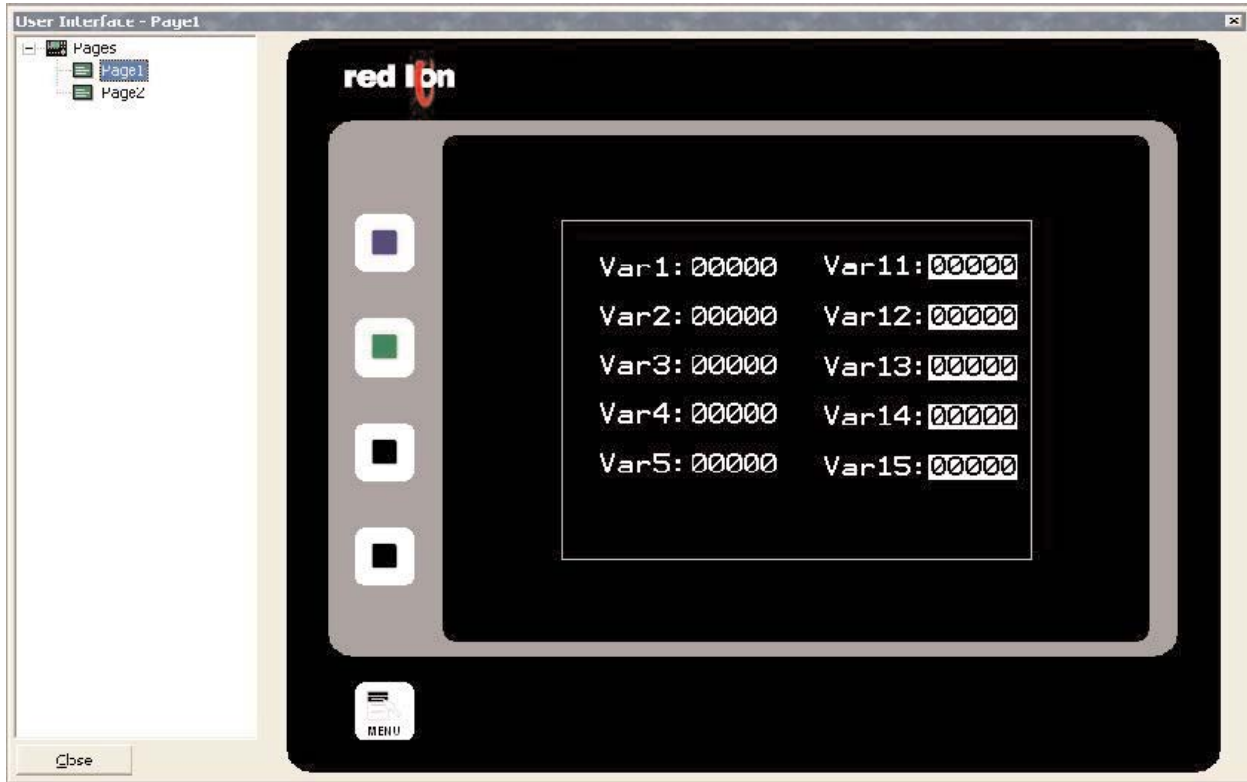


Configuration of the communications in Red Lion Crimson 2.0 Software

Two User Interface pages were setup in the Crimson 2.0 software. Page 1 contained display links for Var1 to Var5 and Var11 to Var15. Var11 to Var15 were configured to allow data entry at the display. Page 2 contained data links for Var21 to Var30 and Var31 to Var40. Var31 to Var35 were configured to allow data entry at the display.



The configuration was saved and updated to the G306 display via the USB connection on the unit.



Configuration of the G306 test display in Red Lion Crimson 2.0 Software

Upon testing with the configured VIM and DeltaV, we discovered that the coils and digital inputs communication failed. We contacted Red Lion tech support and they sent us a new Modbus Slave Driver (file name: 3501.dld, dated 8/5/2005 2:29PM). We were told to copy it into c:\Program Files\Red Lion Controls\Crimson 2.0\DLDs\M68K. Once we did this and updated the G306 display the digital reads and writes worked fine.

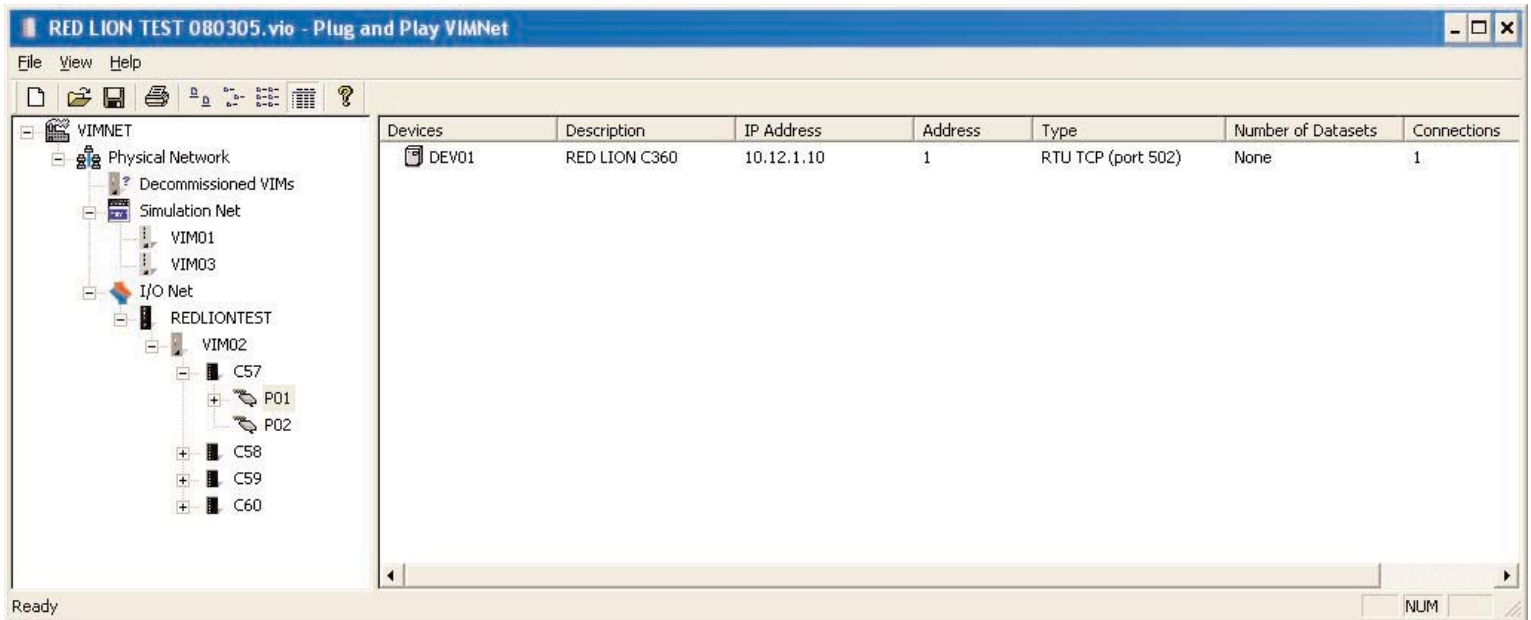


Virtual IO Module Configuration and Setup

The DeltaV Virtual IO Module was configured with MYNAH Technologies' VIMNET Explorer, v6.0.0.7. A configuration summary is as follows:

Driver	Modbus TCP - DSimplex
Firmware Rev	3.4.5
Mac Address	00EC1007092
IP Address	10.12.1.3
Subnet Mask	255.255.252.0

In the VIMNet Explorer application, the C306 Display was setup as device REDLIONTEST, using RTU TCP (port 502) communications and a Modbus address of 1..



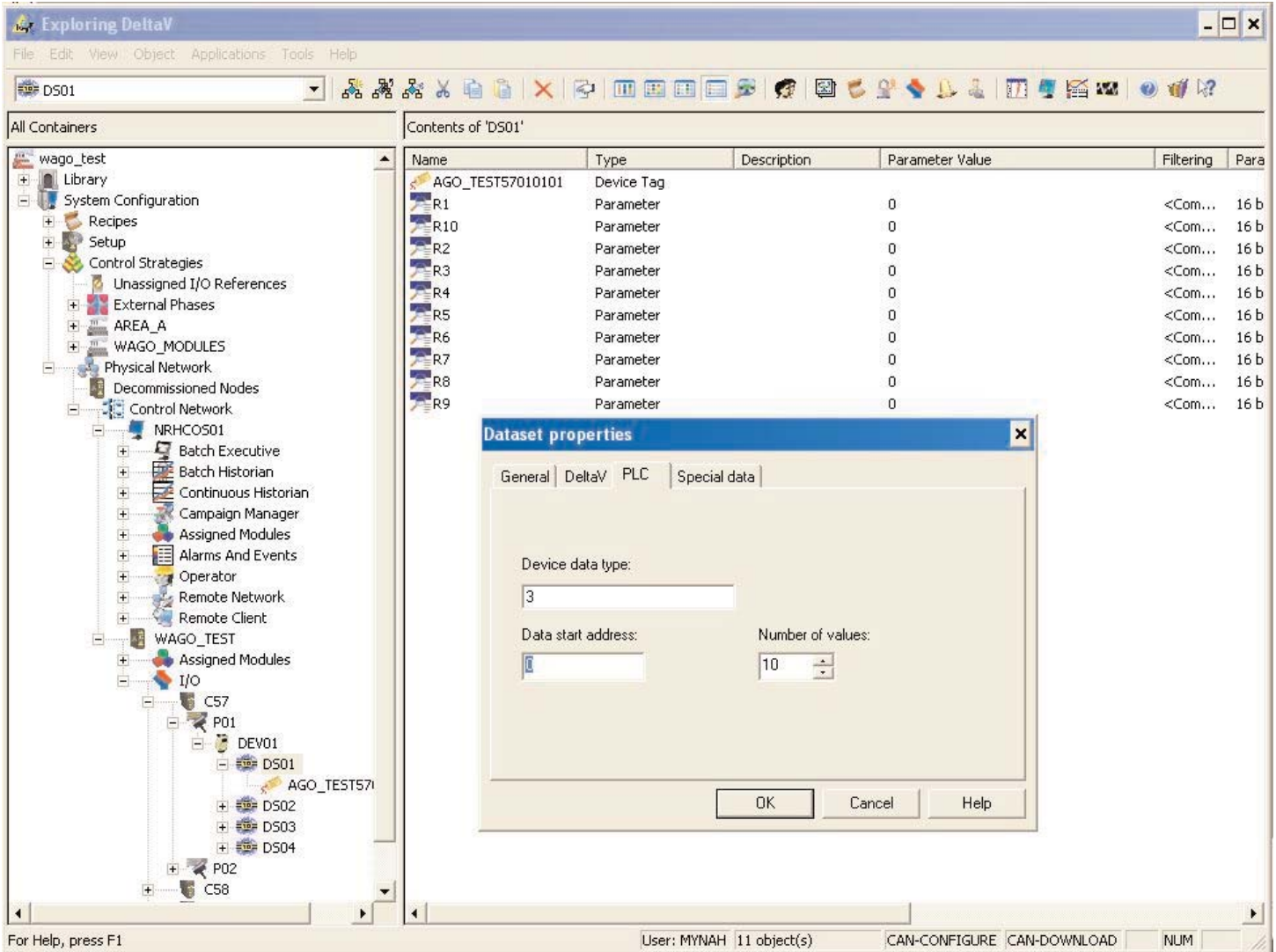
Configuration of the communications in the VIMNet Explorer



DeltaV Configuration and Setup

DeltaV v7.3 build 4069 was used for the testing. A new controller was commissioned, the Virtual IO Module was sensed as Programmable Serial Modules slots 57-60, and PO1 of card 57 was enabled. One device (for the 750-841 controller) and two datasets (input dataset and output dataset) were configured. A summary of the device and dataset communication is as follows:

Device Address	1
DS01 data direction	Output
DS01 DeltaV Data Type	16 bit int w/ status
DS01 Device Data Type	3
DS01 Data start address	0
DS01 Number of values	10
DS01 G306 Mapping	Block 1
DS02 data direction	Input
DS02 DeltaV Data Type	16 bit uint w/ status
DS02 Device Data Type	2
DS02 Data start address	0
DS02 Number of values	10
DS02 G306 Mapping	Block 2
DS03 data direction	Output
DS03 DeltaV Data Type	Boolean w/status
DS03 Device Data Type	0
DS03 Data start address	0
DS03 Number of values	10
DS03 G306 Mapping	Block 4
DS04 data direction	Input
DS04 DeltaV Data Type	Boolean w/status
DS04 Device Data Type	1
DS04 Data start address	0
DS04 Number of values	10
DS04 G306 Mapping	Block 4



DeltaV Explorer showing the "virtual" serial card configuration.

A DeltaV Module was built for displaying the input and output registers from the G306 display controller and for testing purposes. Analog IO values were displayed as unscaled 16 bit registers. Discrete IO values were displayed as Boolean with status. The module was used to write outputs from DeltaV to the G306 display and to read inputs entered at the G306 display pages.



DeltaV Performance Testing

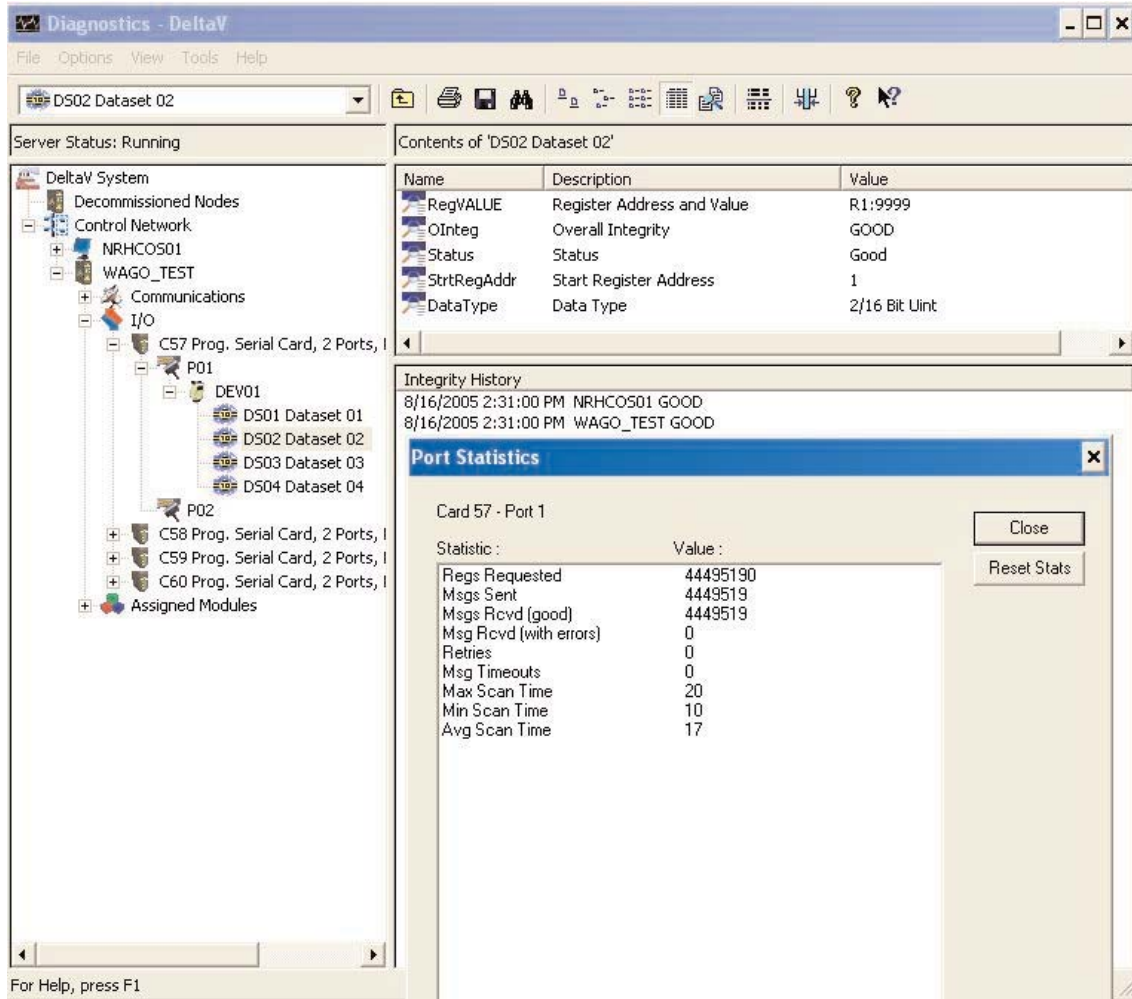
The Red Lion G306 Display is a HMI device. Tieback performance testing is not necessary or pertinent to such a device. All IO types listed above were tested for accuracy of data transmission and normal acceptable update times. No issues were found. DeltaV and VIMNet diagnostics were monitored for other performance indicators. A summary of DeltaV and VIMNet diagnostics performance indicators is as follows:

DeltaV P01 Max Scan Time	30 msec
DeltaV P01 Min Scan Time	10 msec
DeltaV P01 Avg Scan Time	18 msec
DS1-4 Avg Scan Time	20 msec
DS1-4 Time Between Scans	80 msec

Performance Summary and Other Observations:

Performance Summary and Other Observations:

- Update times from the DeltaV Test Module (on-line mode) and the Red Lion display were very quick and no noticeable delays were observed.
- There were no issues with analog resolution between the DeltaV Module and G306 display. Values were transmitted accurately and precisely.
- It is critical to apply the updated Modbus Slave Driver (file name: 3501.dld, dated 8/5/2005 2:29PM) to the display configuration. Digital reads and writes did not work until this new driver was applied.



DeltaV Diagnostics view showing port statistics.

Summary

In summary, we found no problems in using the Red Lion G306 Display with the DeltaV Virtual IO Module and the Modbus TCP/IP Master Driver. Communication speed and performance was as expected and we had no problems with the device in setup or testing.



Contact Information

se contact us for any questions about this application note at:

MYNAH Technologies
504 Trade Center Boulevard
Chesterfield, MO 63005 USA
1 888 506 9624 (North America)
1 636 681 1555 (International)
1 636 681 1660 (fax)
email: support@mynah.com
www.mynah.com

While this information is presented in good faith and believed to be accurate, MYNAH Technologies does not guarantee satisfactory results from reliance upon such information. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding the performance, merchantability, fitness or any other matter with respect to the products, nor as a recommendation to use any product or process in conflict with any patent. Mynah Technologies reserves the right, without notice, to alter or improve the designs or specifications of the products described herein.

©MYNAH Technologies 2005. All rights reserved.

Designs are marks of MYNAH Technologies, Emerson Process Management, DeltaV, and the DeltaV design are marks of one of the Emerson Process Management of companies. All other marks are property of their respective owners. The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, expressed or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the design or specification of such products at any time without notice.