

FreyrSCADA



Embedded Solution

FreyrSCADA Embedded Solution

Software Document

DNP / IEEE1815 Outstation / Server Simulator User Manual

Stack Version: 21.04.001

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Online

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[Distributed Network Protocol \(DNP3\)- IEEE 1815-2012 Product](#)

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1. Introduction

FreyrSCADA DNP3 (IEEE 1815) – Outstation (Server) Simulator was originally developed to test the DNP3(IEEE 1815) stack.

We developed the stack to run multiple hardware platform (windows, linux, RTLinux, qnx..). So we had to test multiple platform. At that time, our engineers, developed the test simulation application.

We tested this simulator with multiple test software available in the market.

The interoperability list focused only for our Stack. If you have any specific requirement to implement new Data type, please contact to us.

Our support team has young, dynamic and professional team of engineers. And they will provide the quick and accurate solution as per customer requirement.

support@freyrscada.com

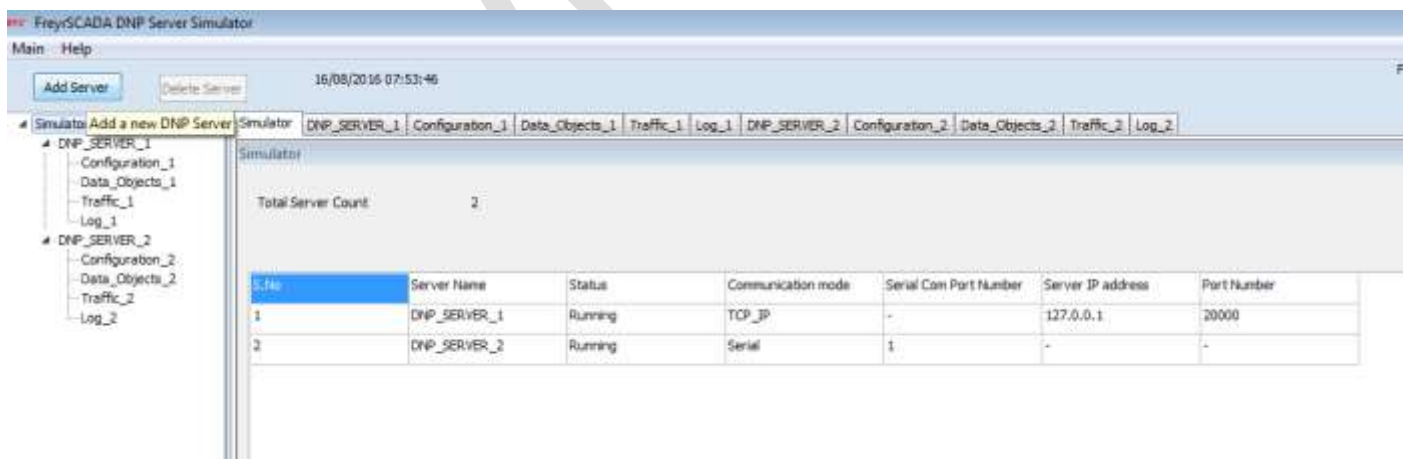
Thanks

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2. Add and Delete Server

We can add up to 50 server node in the simulator. Every server node will work independently.

And also we can delete the server.



Simulator window shows the status & connected Communication channel

TCP – IP Address, Port Number

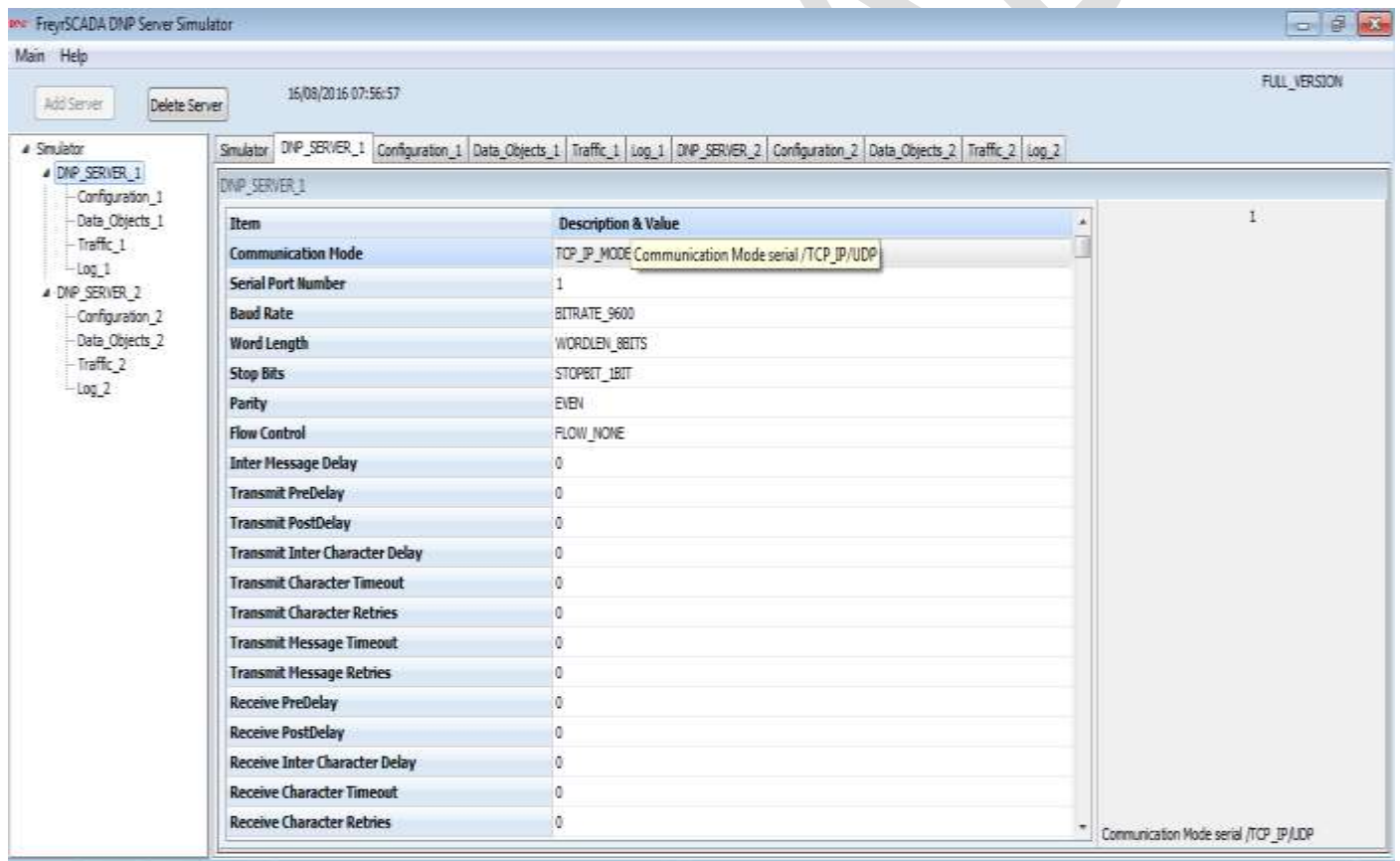
UDP – IP Address, Port Number

Serial – Com Port Number

S.No	Server Name	Status	Communication mode	Serial Com Port Number	Server IP address	Port Number
1	DNP_SERVER_1	Running	TCP_IP	-	127.0.0.1	20000
2	DNP_SERVER_2	Running	Serial	1	-	-

3. Server Configuration

Server Protocol Configuration window shows the actual protocol settings.



Configuration Parameters as follows:

- 1) **Communication Mode** - Communication Mode serial /TCP_IP/UDP
- 2) **Serial Port Number** - Serial COM port number
- 3) **Baud Rate** - Serial Bit/Baud Rate
- 4) **Word Length** - Serial Word Length
- 5) **Stop Bits** - Serial Stop Bits
- 6) **Parity** - Serial Parity
- 7) **Flow Control** - Flow Control
- 8) **Inter Message Delay** - Time between sending and receiving of message only applies after transmitting the message
- 9) **Transmit PreDelay** - Transmit Delay before send
- 10) **Transmit PostDelay** - Delay after send
- 11) **Transmit Inter Character Delay** - Delay between characters during send
- 12) **Transmit Character Timeout** - Timeout if the character is not being sent
- 13) **Transmit Character Retries** - Number of retries to send
- 14) **Transmit Message Timeout** - Message Timeout if entire message is not sent
- 15) **Transmit Message Retries** - Transmit - Message Retries to retry the entire message
- 16) **Receive PreDelay** - Delay before receive
- 17) **Receive PostDelay** - Delay after receive
- 18) **Receive Inter Character Delay** - Delay between characters during receive
- 19) **Receive Character Timeout** - Timeout if the character is not being received
- 20) **Receive Character Retries** - Number of retries to receive a character
- 21) **Receive Message Timeout** - Message Timeout if entire message is not received
- 22) **Receive Message Retries** - Receive - Message Retries to retry the entire message
- 23) **TCP Source IP Address** - TCP, Server, ip address to bind the socket
- 24) **TCP Port Number** - TCP, server, port to bind the socket
- 25) **UDP Source IP Address** - UDP, Server, ip address to bind the socket
- 26) **UDP Port Number** - UDP, server, port to bind the socket
- 27) **UDP -Server transmit Port Number Default** - in udp , server transmit default port number 20000, or in which port data received , server will transmit same port
- 28) **Outstation / Slave Address** - server/Slave/Outstation address range 0 to 65519
- 29) **Master Address** - Expected Master / Client address range 0 to 65519 for unsolicited response
- 30) **Link Layer Timeout** - Link layer time out in milliSeconds (minimum 1000ms - to max)

- 31) **Application Layer Timeout** - application layer timeout in millisecond 5 * Linklayer timeout
- 32) **Time Sync Interval Seconds** - in Seconds, 0 to 3600s (1 hour)
- 33) **Add BI in Class0** - add Binary Input in class 0 request
- 34) **Add DBI in Class0** - add Double Binary Input in class 0 request
- 35) **Add BO in Class0** - add Binary Output in class 0 request
- 36) **Add CI in Class0** - add Counter Input in class 0 request
- 37) **Add FzCI in Class0** - add Frozen Counter Input in class 0 request
- 38) **Add AI in Class0** - add Analog Input in class 0 request
- 39) **Add FzAI in Class0** - add Frozen Analog Input in class 0 request
- 40) **Add AID in Class0** - add Analog Input Deadband in class 0 request
- 41) **Add AO in Class0** - add Analog Output in class 0 request
- 42) **Add OS in Class0** - add Octect String in class 0 request
- 43) **Add BI Event** - add Binary Input Event in class 1,2,3 request
- 44) **Add DBI Event** - add Double Bit Binary Input Event in class 1,2,3 request
- 45) **Add BO Event** - add Binary Output Event in class 1,2,3 request
- 46) **Add CI Event** - add Counter Input Event in class 1,2,3 request
- 47) **Add FzCI Event** - add Frozen Counter Input Event in class 1,2,3 request
- 48) **Add AI Event** - add Analog Input Event in class 1,2,3 request
- 49) **Add FzAI Event** - add Frozen Analog Input Event in class 1,2,3 request
- 50) **Add AID Event** - add Analog Input Deadband Event in class 1,2,3 request
- 51) **Add AO Event** - add Analog Output Event in class 1,2,3 request
- 52) **Add OS Event** - add Octect String Event in class 1,2,3 request
- 53) **Add VTO Event** - add Vitual terminal output Event in class 1,2,3 request
- 54) **AI Deadband Method** - Analog Input Deadband Calculation method
- 55) **Frozen Analog Input Support** - False- stack will not create points for frozen analog input
- 56) **Eanble Unsolicited** - enable to server send unsolicited message
- 57) **Unsolicited - Enable Responses on Startup** - enable to server send unsolicited message on statup
- 58) **Unsolicited Response Timeout** - timeout in milliseconds for unsolicites response from master minimum 1000 max app layer timeout
- 59) **Unsolicited Retries** - Unsolicited message retries default 5, min 1, max 10
- 60) **Unsolicited - Max Number of Events** - each Unsolicited message contains max no of events minimum 1 -255

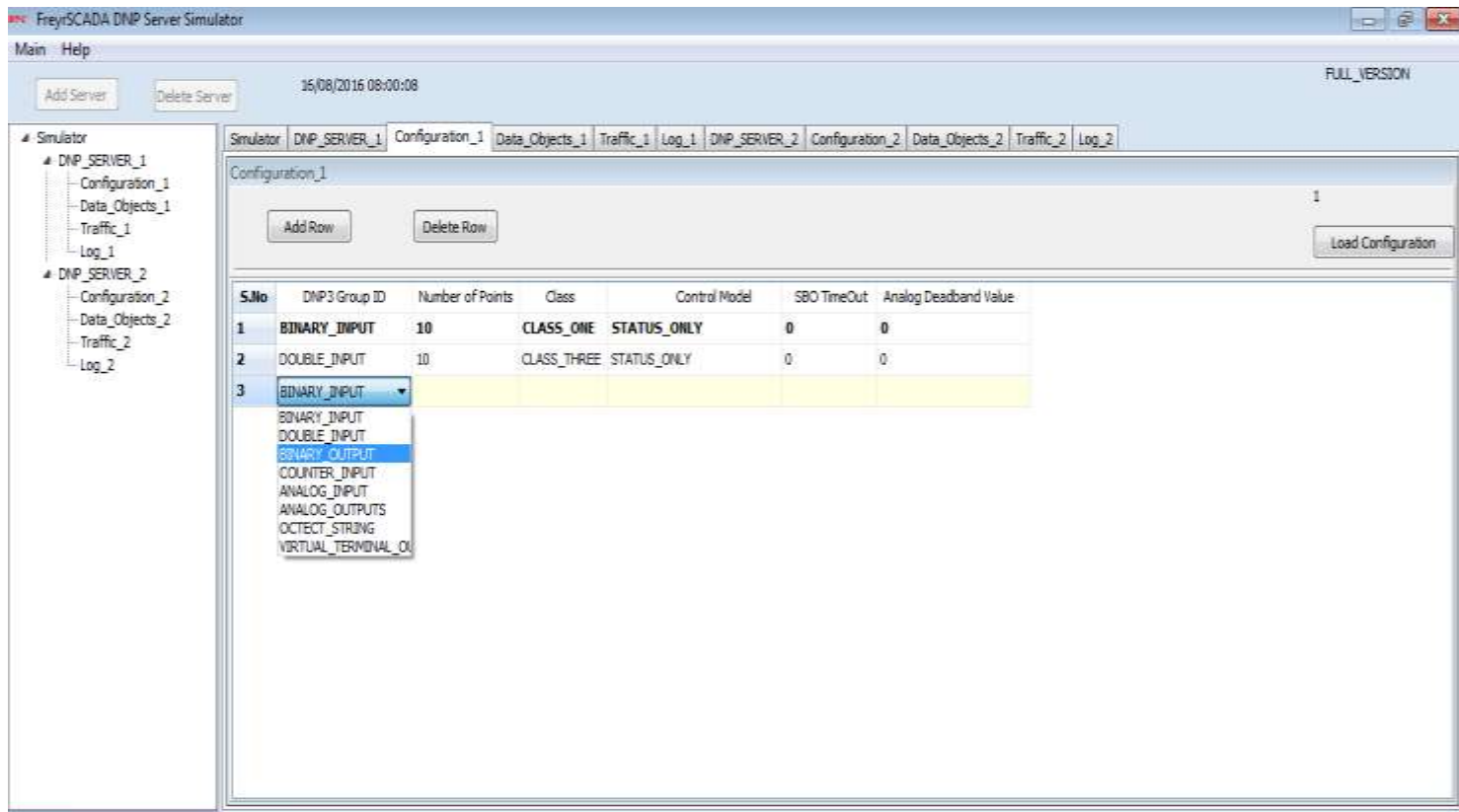
- 61) **Unsolicited - Class 1 Trigger Number of Events** - Class 1 Number of Class events to trigger the unsolicited response message , value should be < u16ClassEventBufferSize if it is 0, unsolicited will not trigger from class event
- 62) **Unsolicited - Class 1 Hold Time After Response** - class 1 after send the class unsolicited message Hold Time in ms,
- 63) **Unsolicited - Class 2 Trigger Number of Events** - Class 2 Number of Class events to trigger the unsolicited response message , value should be < u16ClassEventBufferSize if it is 0, unsolicited will not trigger from class event
- 64) **Unsolicited - Class 2 Hold Time After Response** - class 2 after send the class unsolicited message Hold Time in ms, "
- 65) **Unsolicited - Class 3 Trigger Number of Events** - Class 3 Number of Class events to trigger the unsolicited response message , value should be < u16ClassEventBufferSize if it is 0, unsolicited will not trigger from class event
- 66) **Unsolicited - Class 3 Hold Time After Response** - class 3 after send the class unsolicited message Hold Time in ms,
- 67) **Class 1 buffer Size - Class 1 EventBufferSize** - no of events to hold minimum 50
- 68) **Class 1 buffer Overflow Percentage** - Class 1 buffer overflow percentage 50 to 95
- 69) **Class 2 buffer Size - Class 2 EventBufferSize** - no of events to hold minimum 50
- 70) **Class 2 buffer Overflow Percentage** - Class 2 buffer overflow percentage 50 to 95
- 71) **Class 3 buffer Size - Class 3 EventBufferSize** - no of events to hold minimum 50
- 72) **Class 3 buffer Overflow Percentage** - Class 3 buffer overflow percentage 50 to 95
- 73) **Default Static Variation - BinaryInput** - Default Static Variation for Binary Input
- 74) **Default Static Variation - DoubleBit BinaryInput** - Default Static Variation for DoubleBit BinaryInput
- 75) **Default Static Variation – BinaryOutput** - Default Static Variation for Binary Output
- 76) **Default Static Variation – CounterInput** - Default Static Variation for Counter Input
- 77) **Default Static Variation – FrozenCounterInput** - Default Static Variation for Frozen Counter Input
- 78) **Default Static Variation – AnalogInput** - Default Static Variation for Analog Input
- 79) **Default Static Variation – FrozenAnalogInput** - Default Static Variation for Frozen Analog Input
- 80) **Default Static Variation – AnalogInputDeadBand** - Default Static Variation for Analog Input DeadBand
- 81) **Default Static Variation – AnalogOutput** - Default Static Variation for Analog Output
- 82) **Default Event Variation – BinaryInput** - Default Event Variation for Binary Input
- 83) **Default Event Variation - DoubleBit BinaryInput** - Default Event Variation for DoubleBit Binary Input
- 84) **Default Event Variation – CounterInput** - Default Event Variation for Counter Input
- 85) **Default Event Variation – AnalogInput** - Default Event Variation for Analog Input
- 86) **Default Event Variation – FrozenCounterInput** - Default Event Variation for Frozen Counter Input

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- 87) **Default Event Variation – FrozenAnalogInput** - Default Event Variation Frozen Analog Input
 - 88) **Enable Self Address Support** - Enable Self Address Support
 - 89) **Enable UTC time** - enable utc time/ local time
 - 90) **Enable FileTransfer** - Enable File Transfr Support
 - 91) **Enable Local Mode** - If local mode set true, then -all remote command for binary output/ analog output control statusset to not supported
 - 92) **Update Check Time Stamp** - if it true ,the timestamp change also generate event during the DNP3update

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4. Server Data Configuration

Server Data Configuration window shows the point list configuration.



DNP Group to choose

BINARY_INPUT - Binary Input (DNP3Group 1)

DOUBLE_INPUT - Double-bit Binary Input (DNP3Group 3)

BINARY_OUTPUT - Binary Output (DNP3Group 10)

COUNTER_INPUT - Counter Input (DNP3Group 20)

ANALOG_INPUT - Analog Input (DNP3Group 30)

ANALOG_OUTPUTS - Analog output (DNP3Group 40)

OCTECT_STRING - Octect String (DNP3Group 110)

VIRTUAL_TERMINAL_OUTPUT - virtual terminal String (DNP3Group 112)

5. Update DNP Datatype Information

The user can update the Point information .The following parameters can change Value, quality bits and according to DNP group, and the change reported to end client system by class / integration polling , unsolicited reporting .

Data_Objects_1

Start Communication Stop Communication 1

S.No	DNP3 Group Id	Index Number	Value	Quality Bits	Time Stamp	Class	Control Model
1	BINARY_INPUT	0	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
2	BINARY_INPUT	1	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
3	BINARY_INPUT	2	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
4	BINARY_INPUT	3	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
5	BINARY_INPUT	4	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
6	BINARY_INPUT	5	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
7	BINARY_INPUT	6	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
8	BINARY_INPUT	7	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
9	BINARY_INPUT	8	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
10	BINARY_INPUT	9	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
11	DOUBLE_INPUT	0	0	ONLINE	08:14:21 16/08/2016	CLASS_THREE	STATUS_ONLY
12	DOUBLE_INPUT	1	0	ONLINE	08:14:21 16/08/2016	CLASS_THREE	STATUS_ONLY
13	DOUBLE_INPUT	2	0	ONLINE	08:14:21 16/08/2016	CLASS_THREE	STATUS_ONLY
14	DOUBLE_INPUT	3	0	ONLINE	08:14:21 16/08/2016	CLASS_THREE	STATUS_ONLY
15	DOUBLE_INPUT	4	0	ONLINE	08:14:21 16/08/2016	CLASS_THREE	STATUS_ONLY

DNP Update DNP3 Data Type 1

Analog_Input

Index Number 1

Value 123.456

Quality Bits

ONLINE
 RESTART
 COMM_LOST
 REMOTE_FORCED
 LOCAL_FORCED
 OVER_RANGE
 REFERENCE_ERR

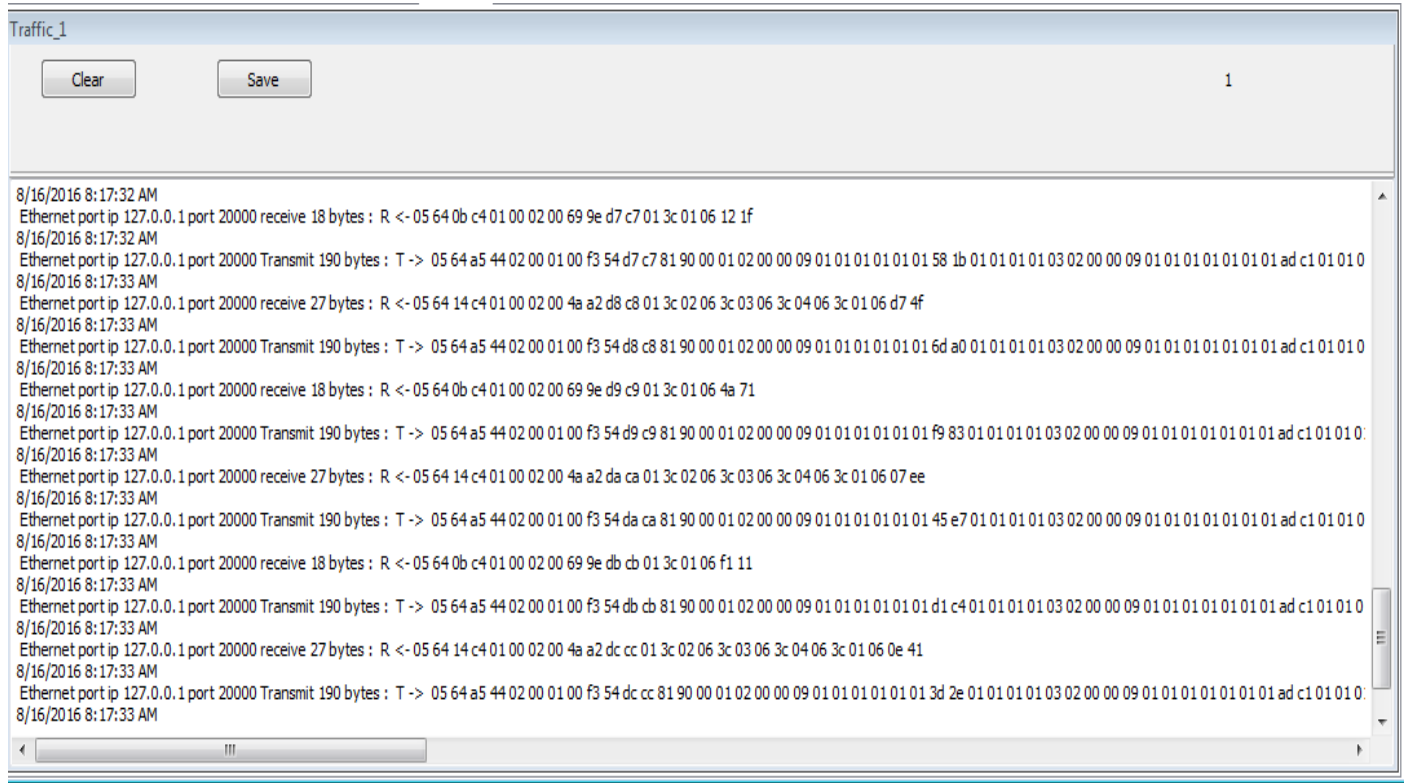
Update Analog Input Point

Close

6. Traffic window

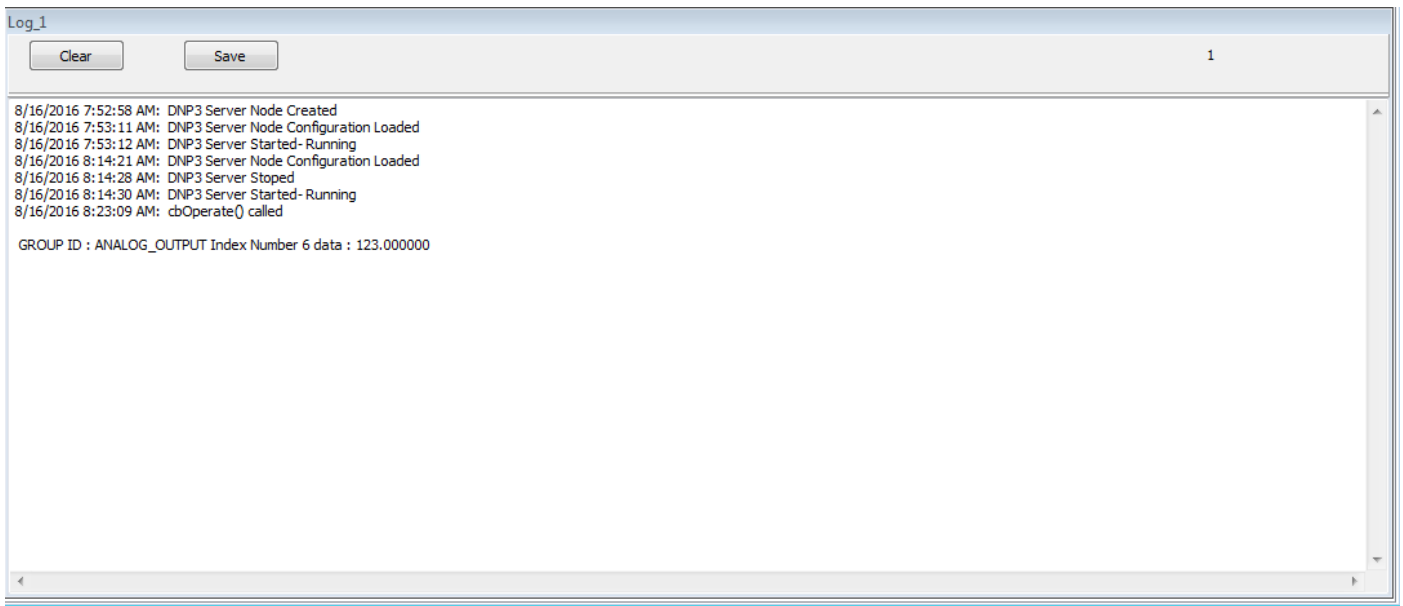
In this we can monitor the traffic of DNP, TCP, UDP, Serial communication.

In this we can save the traffic, and clear the traffic



7. Log Window

Log window for internal reference



In the log, we can monitor the command exchange between server & master, and there is an option to save the log & clear log.

For more information, just drop a mail to support@freyrscada.com