DNP3 Protocol Outstation RTU IED Server Simulator

User Manual

Stack Version: 21.05.008

DNP3 Protocol

FreyrSCADA Embedded Solution

No.5, BommaiyaSamy Kovil Street, Annanji, Theni, TamilNadu, India

www.freyrscada.com

CIN: U72900TN2018PTC120601

\

Contents

Introduction

DNP3 was first developed by Westronic and was released in 1993. This protocol is widely used among the electric, oil and gas, and wastewater/water utilities.

It is preferred among the electric utilities. All these characteristics that are highly-valued among electric utilities and the oil and gas industry with widely remote field stations.

DNP3 was based upon the early drafts of IEC 60870-5. DNP3 was extended in 1998 to be encapsulated in either a TCP or UDP packet (TCP is typically used).

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

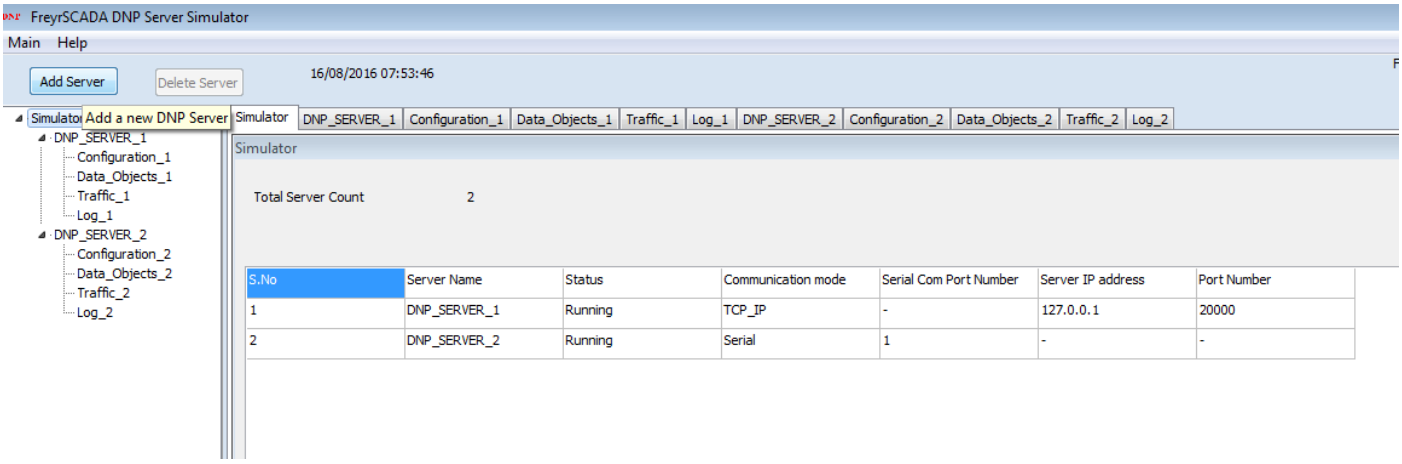
Thanks

Management- FreyrSCADA Embedded Solution

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.

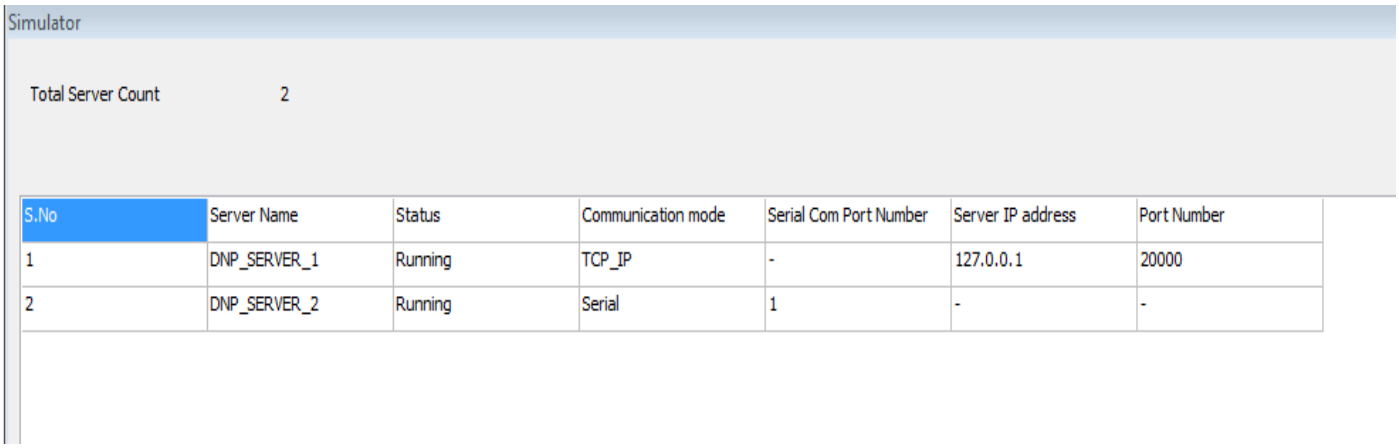


Simulator window shows the status & connected Communication channel

TCP – IP Address, Port Number

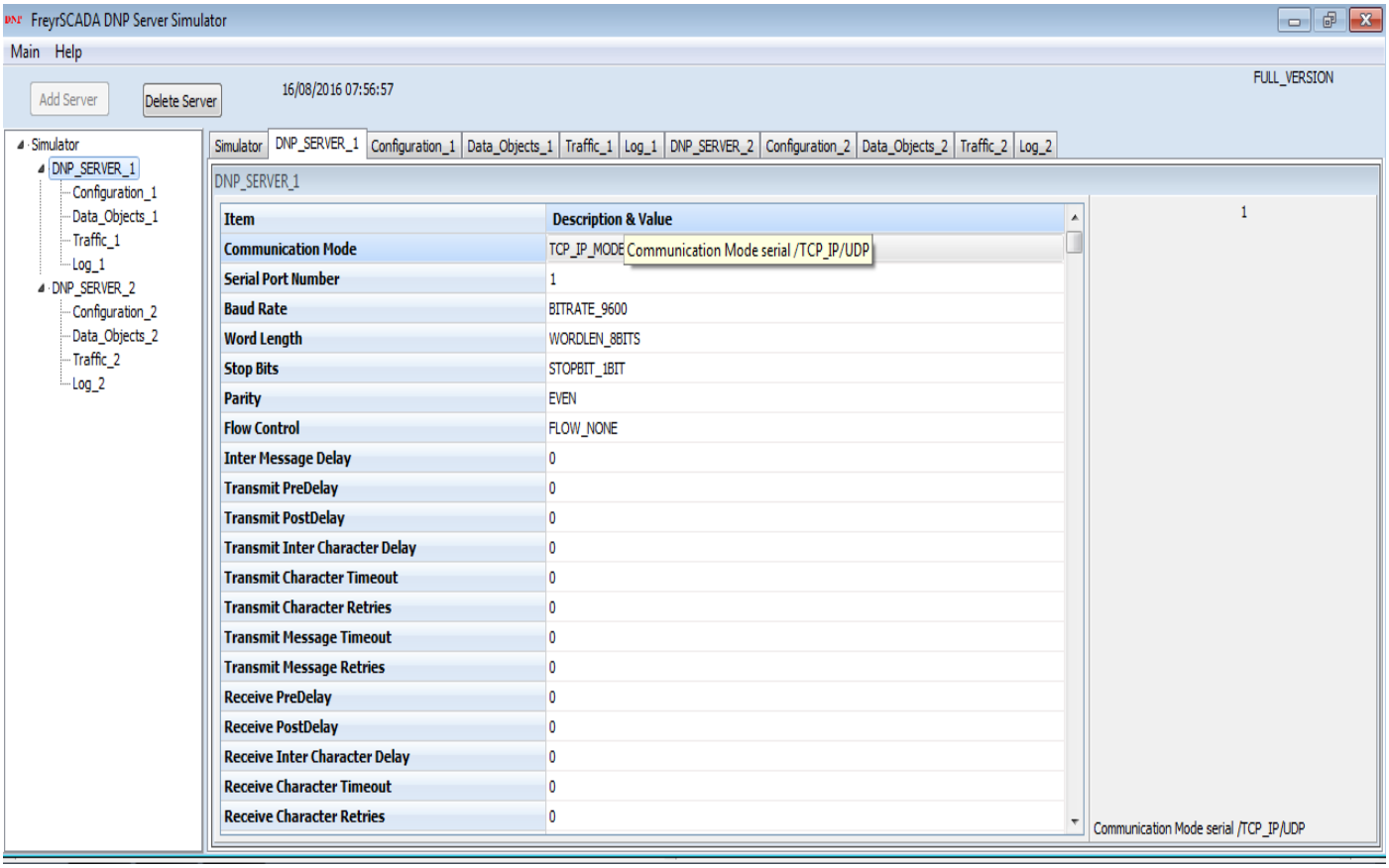
UDP – IP Address, Port Number

Serial – Com Port Number



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 termianal 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, unsoltiated will not trigger from class event

62) **Unsolicited - Class 1 Hold Time After Response** - class 1 after send the class unsoldiated 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, unsoltiated will not trigger from class event

64) **Unsolicited - Class 2 Hold Time After Response** - class 2 after send the class unsoldiated message Hold Time in ms, "

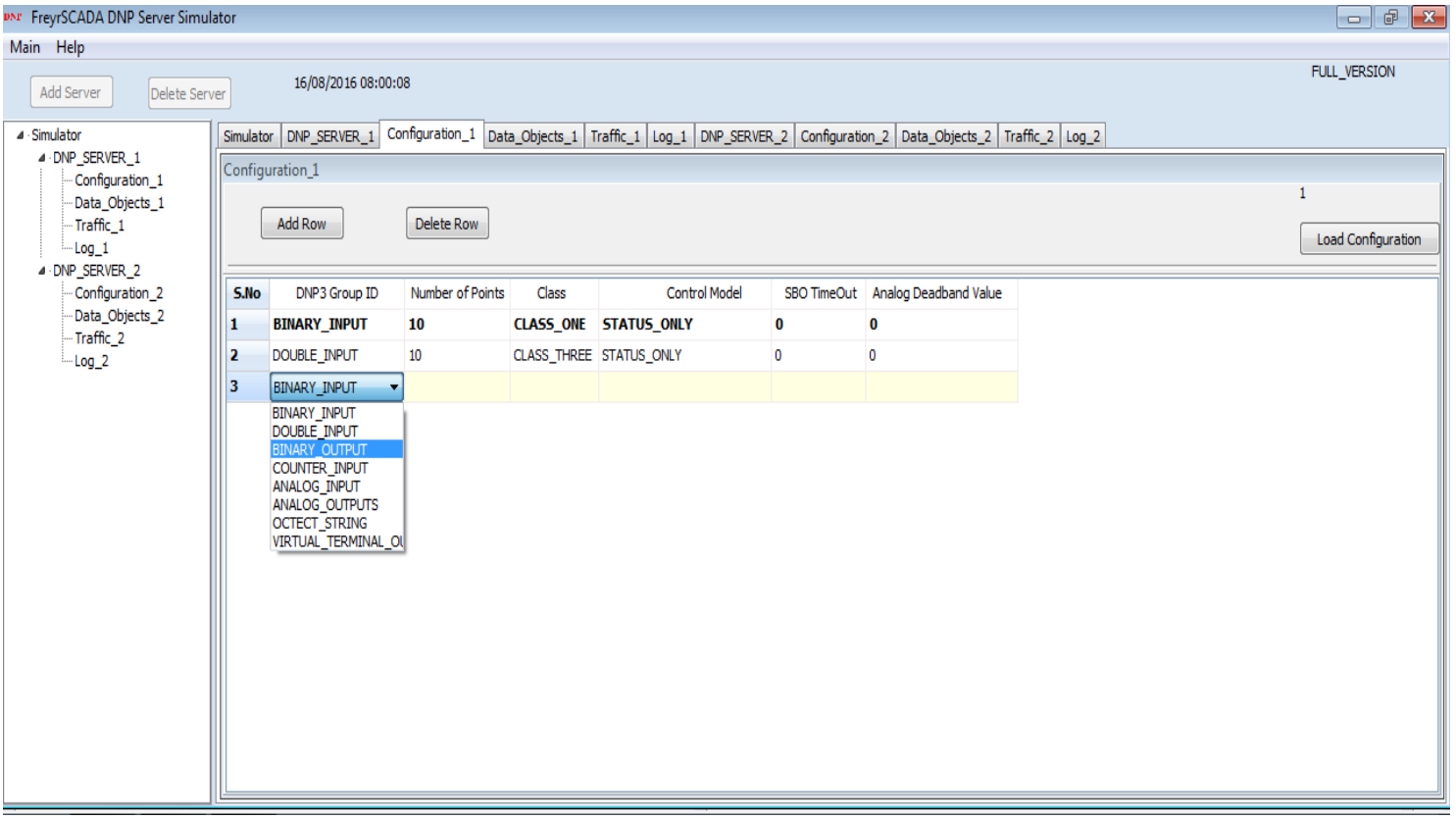
65) **Unsolicited - Class 3 Trigger Number of Events** - Class 3 Number of Class events to trigger the unsolicited response message , value should be < u16ClassEventBufferSize if it is 0, unsoltiated will not trigger from class event

66) **Unsolicited - Class 3 Hold Time After Response** - class 3 after send the class unsoldiated 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
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

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)

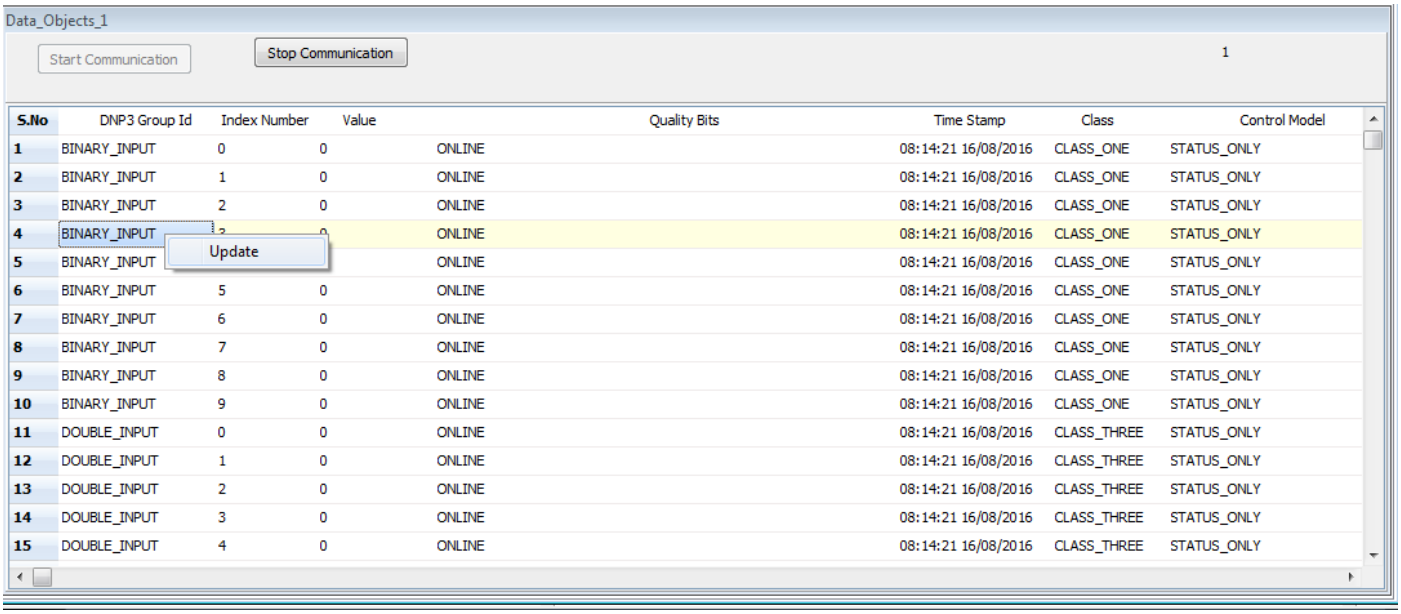
ANALOG_OUTPUTS - Analog output (DNP3Group 40)

OCTECT_STRING - Octect String (DNP3Group 110)

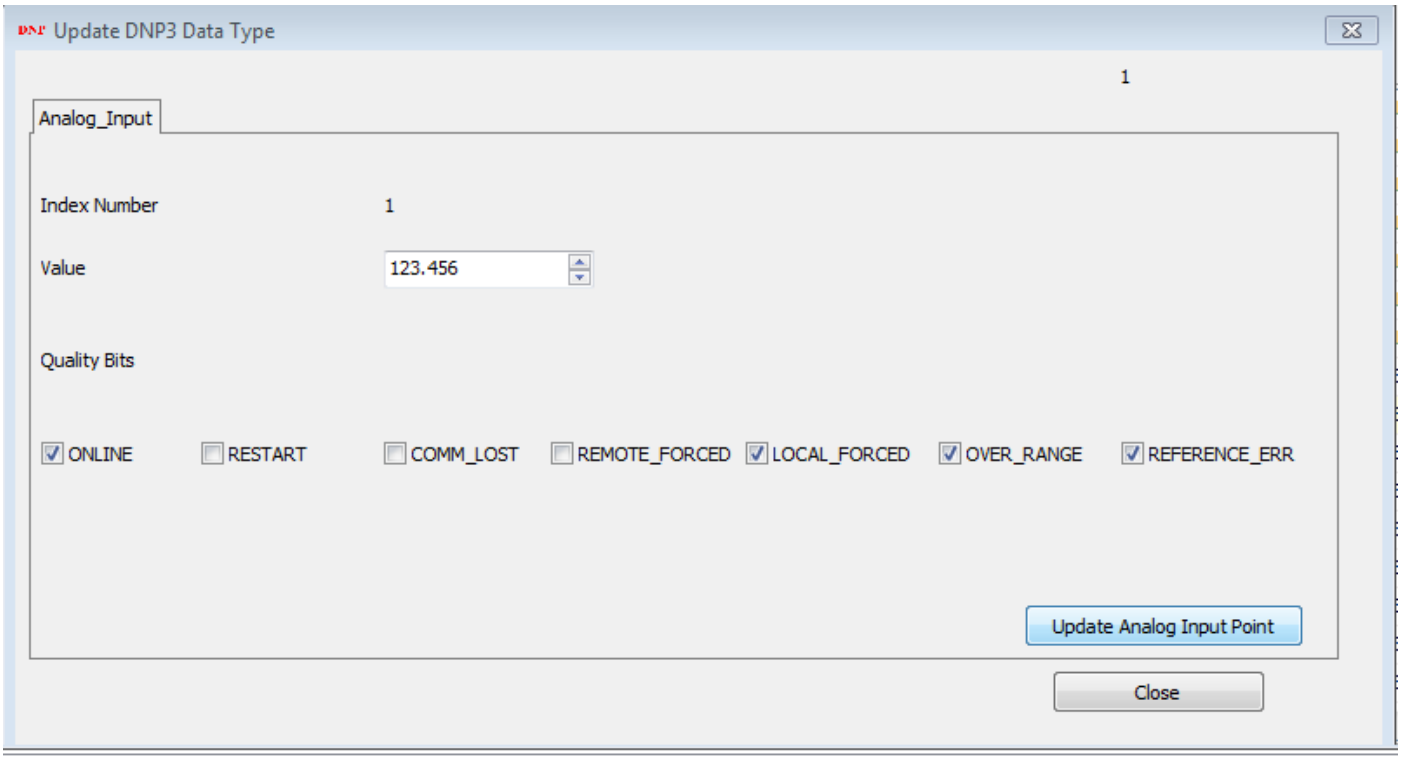
VIRTUAL_TERMINAL_OUTPUT - virtual terminal String (DNP3Group 112)

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 .



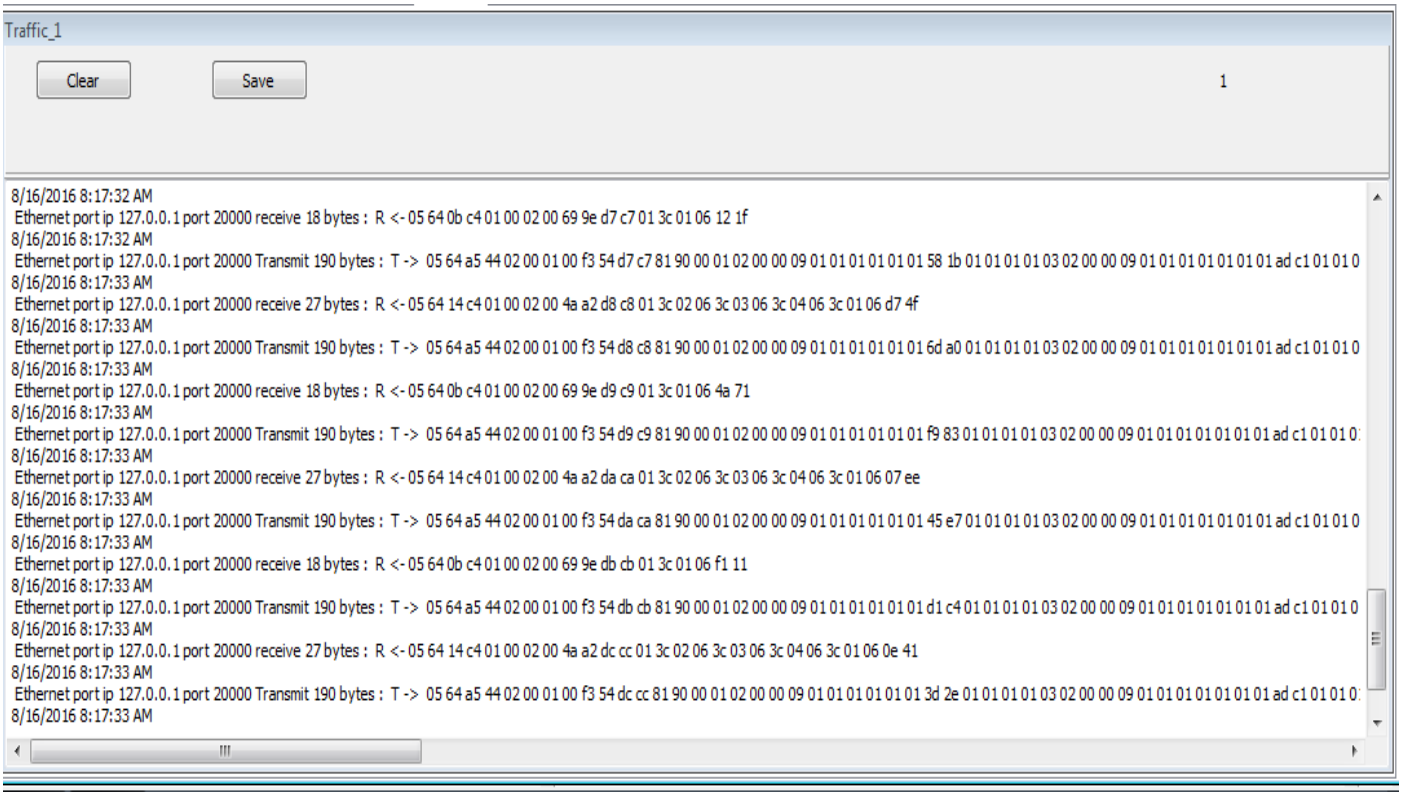
S.No	DNP3 Group Id	Index Number	Value	Quality Bits	Time Stamp	Class	Control Model
1	BINARY_INPUT	0	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
2	BINARY_INPUT	1	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
3	BINARY_INPUT	2	0	ONLINE	08:14:21 16/08/2016	CLASS_ONE	STATUS_ONLY
4	BINARY_INPUT	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



Traffic window

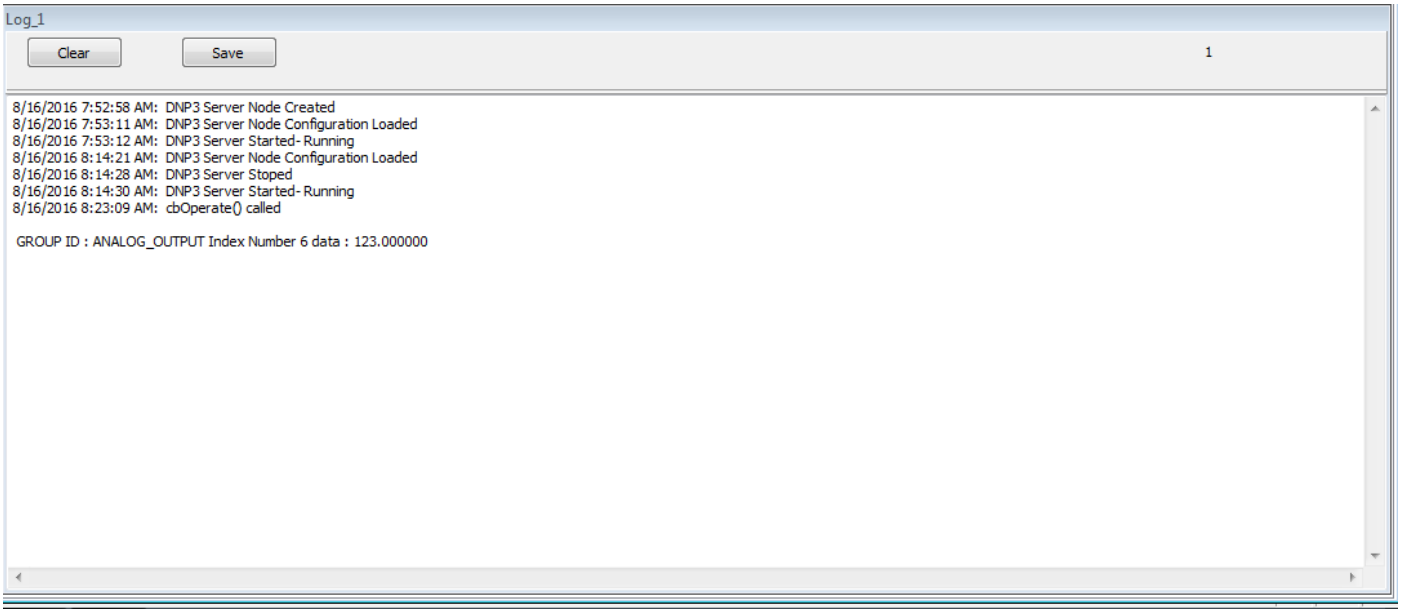
In this we can monitor the traffic of DNP, TCP, UDP, Serial communication.

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



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