



**DNP3.0 Serial Slave Protocol Details  
for  
KALKI Protocol Gateway/GatewayLite**

**Product User Guide**

Version – 1.0

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## 1. Introduction

The purpose of this document is to describe the functionalities of DNP3.0 serial Master protocol implemented in the Kalki Protocol Gateway / Kalki Substation GatewayLite. This will contain details of interoperability, configuration details & mapping of the data from some of the other master protocols available in Kalki Protocol Gateway.

## 2. DNP V3.0 Device Profile

The following table provides a “Device Profile Document” in the standard format defined in the DNP 3.0 Subset Definitions Document. It is only a component of a total interoperability guide. The table, in combination with the Implementation Table provided in Section 3, and the Point List Tables provided in Section 4 should provide a complete configuration/interoperability guide for communicating with KSGL / KPG.

<b>DNP V3.00</b>	
<b>DEVICE PROFILE DOCUMENT</b>	
Vendor Name: <b>Kalki Communication Technologies Private Limited</b>	
Device Name: <b>KSGL and KPG</b>	
Highest DNP Level Supported:	Device Function:
For Requests: <b>Level 3</b> For Responses: <b>Level 3</b>	<input type="checkbox"/> Master <input checked="" type="checkbox"/> <b>Slave</b>
Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):	
<b>Assign Class Function Code (FC 22) is supported for Binary Inputs and Analog Inputs</b> <b>The read function code for Object 50 (Time and Date), variation 1, is supported.</b> <b>Analog Input Deadbands, Object 34, variations 1 and 2, are supported.</b>	
Maximum Data Link Frame Size (octets):	Maximum Application Fragment Size (octets):
Transmitted: <b>292</b> Received: <b>292</b>	Transmitted: <b>2048</b> Received: <b>2048</b>
Maximum Data Link Re-tries:	Maximum Application Layer Re-tries:
<input type="checkbox"/> None <input type="checkbox"/> Fixed at ____ <input checked="" type="checkbox"/> <b>Configurable from 0 to 255</b>	<input checked="" type="checkbox"/> <b>None</b> <input type="checkbox"/> Configurable
Requires Data Link Layer Confirmation:	
<input type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input checked="" type="checkbox"/> <b>Configurable as: Never, Only for multi-frame messages, or Always.</b>	

# DNP V3.00

## DEVICE PROFILE DOCUMENT

Requires Application Layer Confirmation:

- Never
- Always
- When reporting Event Data**
- When sending multi-fragment responses**
- Sometimes
- Configurable

Timeouts while waiting for:

- |                          |   |   |                                   |  |
|--------------------------|---|---|-----------------------------------|--|
| Data Link Confirm:       | <input type="checkbox"/> None                   | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input checked="" type="checkbox"/> <b>Configurable,</b> |
| Complete Appl. Fragment: | <input checked="" type="checkbox"/> <b>None</b> | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input type="checkbox"/> Configurable                    |
| Application Confirm:     | <input checked="" type="checkbox"/> <b>None</b> | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input type="checkbox"/> Configurable                    |
| Complete Appl. Response: | <input type="checkbox"/> None                   | <input type="checkbox"/> Fixed at _____ | <input type="checkbox"/> Variable | <input checked="" type="checkbox"/> <b>Configurable</b>  |

Sends/Executes Control Operations:

WRITE Binary Outputs	<input checked="" type="checkbox"/> <b>Never</b>	Always	Sometimes	Configurable
SELECT/OPERATE	Never	Always	Sometimes	<input checked="" type="checkbox"/> <b>Configurable</b>
DIRECT OPERATE	Never	Always	Sometimes	<input checked="" type="checkbox"/> <b>Configurable</b>
DIRECT OPERATE – NO ACK	Never	Always	Sometimes	<input checked="" type="checkbox"/> <b>Configurable</b>
Count > 1	<input checked="" type="checkbox"/> <b>Never</b>	Always	Sometimes	Configurable
Pulse On	<input checked="" type="checkbox"/> <b>Never</b>	Always	Sometimes	Configurable
Pulse Off	<input checked="" type="checkbox"/> <b>Never</b>	Always	Sometimes	Configurable
Latch On	Never	<input checked="" type="checkbox"/> <b>Always</b>	Sometimes	Configurable
Latch Off	Never	<input checked="" type="checkbox"/> <b>Always</b>	Sometimes	Configurable
Queue	<input checked="" type="checkbox"/> <b>Never</b>	Always	Sometimes	Configurable
Clear Queue	<input checked="" type="checkbox"/> <b>Never</b>	Always	Sometimes	Configurable

# DNP V3.00

## DEVICE PROFILE DOCUMENT

<p>Reports Binary Input Change Events when no specific variation requested:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Never</li> <li><input checked="" type="checkbox"/> <b>Only time-tagged</b></li> <li><input type="checkbox"/> Only non-time-tagged</li> <li><input type="checkbox"/> Configurable to send one or the other</li> </ul>	<p>Reports time-tagged Binary Input Change Events when no specific variation requested:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Never</li> <li><input checked="" type="checkbox"/> <b>Binary Input Change With Time</b></li> <li><input type="checkbox"/> Binary Input Change With Relative Time</li> <li><input type="checkbox"/> Configurable</li> </ul>																					
<p>Sends Unsolicited Responses:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Never</li> <li><input checked="" type="checkbox"/> <b>Configurable</b></li> <li><input type="checkbox"/> Only certain objects</li> <li><input type="checkbox"/> Sometimes (attach explanation)</li> <li><input checked="" type="checkbox"/> <b>Enable / Disable unsol</b></li> </ul>	<p>Sends Static Data in Unsolicited Responses:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> <b>Never</b></li> <li><input type="checkbox"/> When Device Restarts</li> <li><input type="checkbox"/> When Status Flags Change</li> </ul>																					
<p>Default Counter Object/Variation:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> <b>No Counters Reported</b></li> <li><input type="checkbox"/> Configurable</li> <li><input type="checkbox"/> Default Object</li> <li>Default Variation: <ul style="list-style-type: none"> <li><input type="checkbox"/> Point-by-point list attached</li> </ul> </li> </ul>	<p>Counters Roll Over at:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> <b>No Counters Reported</b></li> <li><input type="checkbox"/> Configurable (attach explanation)</li> <li><input type="checkbox"/> 16 Bits</li> <li><input type="checkbox"/> 32 Bits</li> <li><input type="checkbox"/> Other Value: _____</li> <li><input type="checkbox"/> Point-by-point list attached</li> </ul>																					
<p>Sends Multi-Fragment Responses:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Yes</li> <li><input type="checkbox"/> No</li> <li><input checked="" type="checkbox"/> <b>Configurable</b></li> </ul>																						
<p>Sequential File Transfer Support:</p> <table style="width:100%; border: none;"> <tr> <td style="width:35%;">Append File Mode</td> <td style="width:15%;">Yes</td> <td style="width:15%;"><input checked="" type="checkbox"/> <b>No</b></td> </tr> <tr> <td>Custom Status Code Strings</td> <td>Yes</td> <td><input checked="" type="checkbox"/> <b>No</b></td> </tr> <tr> <td>Permissions Field</td> <td>Yes</td> <td><input checked="" type="checkbox"/> <b>No</b></td> </tr> <tr> <td>File Events Assigned to Class</td> <td>Yes</td> <td><input checked="" type="checkbox"/> <b>No</b></td> </tr> <tr> <td>File Events Poll Specifically</td> <td>Yes</td> <td><input checked="" type="checkbox"/> <b>No</b></td> </tr> <tr> <td>Multiple Blocks in a Fragment</td> <td>Yes</td> <td><input checked="" type="checkbox"/> <b>No</b></td> </tr> <tr> <td>Max Number of Files Open</td> <td align="center"><b>0</b></td> <td></td> </tr> </table>		Append File Mode	Yes	<input checked="" type="checkbox"/> <b>No</b>	Custom Status Code Strings	Yes	<input checked="" type="checkbox"/> <b>No</b>	Permissions Field	Yes	<input checked="" type="checkbox"/> <b>No</b>	File Events Assigned to Class	Yes	<input checked="" type="checkbox"/> <b>No</b>	File Events Poll Specifically	Yes	<input checked="" type="checkbox"/> <b>No</b>	Multiple Blocks in a Fragment	Yes	<input checked="" type="checkbox"/> <b>No</b>	Max Number of Files Open	<b>0</b>	
Append File Mode	Yes	<input checked="" type="checkbox"/> <b>No</b>																				
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### 3. DNP V3.0 Implementation Table

The following table identifies which object variations, function codes, and qualifiers, which DNP 3.0 Slave supports in both request messages and in response messages. For static (non-change-event) objects, requests sent with qualifiers 00, 01, 06, 07, or 08, will be responded with qualifiers 00 or 01. Requests sent with qualifiers 17 or 28 will be responded with qualifiers 17 or 28. For change-event objects, qualifiers 17 or 28 are always responded.

In the table below, text shaded as **00, 01 (start stop)** indicates Subset Level 3 functionality (beyond Subset Level 2).

In the table below, text shaded as **07, 08 (limited qty)** indicates functionality beyond Subset Level 3.

OBJECT			REQUEST (Slave will parse)		RESPONSE (Master must parse)	
Object Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
1	0	Binary Input – Any Variation	1 (read) 22 (assign class)	00, 01(start-s 06(no range, 07, 08(limited 17, 28(index)		
1	1	Binary Input	1 (read)	00, 01(start-s 06(no range, 07, 08(limited 17, 28(index)	129(response)	00, 01(start-s 17, 28(index see note 1)
1	2	Binary Input with Status	1 (read)	00, 01(start-s 06(no range, 07, 08(limited 17, 28(index)	129(response)	00, 01(start-s 17, 28(index see note 2)
2	0	Binary Input Change – Any Variation	1 (read)	06(no range, 07, 08(limited		
2	1	Binary Input Change without Time	1 (read)	06(no range, 07, 08(limited	129(response) 130(unsol. r	17, 28(index)
2	2	Binary Input Change with Time	1 (read)	06(no range, 07, 08(limited	129(response) 130(unsol. r	17, 28(index)
10	0	Binary Output Status – Any Variation	1 (read)	00, 01(start-s 06(no range, 07, 08(limited 17, 28(index)		
10	2	Binary Output Status	1 (read)	00, 01(start-s 06(no range, 07, 08(limited 17, 28(index)	129(response)	00, 01(start-s 17, 28(index see note 1)
12	1	Control Relay Output Block	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, no	00, 01(start-s 07, 08(limited 17, 28(index)	129(response)	echo of request

OBJECT			REQUEST (Slave will parse)		RESPONSE (Master must parse)	
Object Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
30	0	Analog Input - Any Variation	1 (read) 22(assign c	00, 01(start-s 06(no range, 07, 08(limitec 17, 28(index)		
30	3	32-Bit Analog Input without Flag	1 (read)	00, 01(start-s 06(no range, 07, 08(limitec 17, 28(index)	129(respon	00, 01(start-s 17, 28(index see note 1)
30	4	16-Bit Analog Input without Flag	1 (read)	00, 01(start-s 06(no range, 07, 08(limitec 17, 28(index)	129(respon	00, 01(start-s 17, 28(index see note 1)
30	5	short floating point	1	00, 01(start-s 06(no range, 07, 08(limitec 17, 28(index)	129(respon	00, 01(start-s 17, 28(index see note 1)
32	0	Analog Change Event – Any Variation	1 (read)	06(no range, 07, 08(limitec		
32	1	32-Bit Analog Change Event without Time	1 (read)	06(no range, 07, 08(limitec	129(respons 130(unsol. r	17, 28(index)
32	2	16-Bit Analog Change Event without Time	1 (read)	06(no range, 07, 08(limitec	129(respons 130(unsol. r	17, 28(index)
32	3	32-Bit Analog Change Event with Time	1 (read)	06(no range, 07, 08(limitec	129(respons 130(unsol. r	17, 28(index)
32	4	16-Bit Analog Change Event with Time	1 (read)	06(no range, 07, 08(limitec	129(respons 130(unsol. r	17, 28(index)
34	0	Analog Input Deadband (Variation 0 is used to request default variation)	1 (read)	06(no range, 07, 08(limitec		
34	1	16 bit Analog Input Deadband	1 (read)	06(no range, 07, 08(limitec	129(respons 130(unsol. r	17, 28(index)
34	2	32 bit Analog Input Deadband	1 (read)	06(no range, 07, 08(limitec	129(respons 130(unsol. r	17, 28(index)
40	0	Analog Output Status (Variation 0 is used to request default variation)	1 (read)	00, 01(start-s 06(no range, 07, 08(limitec 17, 28(index)		
40	2	16-Bit Analog Output Status	1 (read)	00, 01(start-s 06(no range, 07, 08(limitec 17, 28(index)	129(respon	00, 01(start-s 17, 28(index see note 1)
40	3	short floating point Analog Output Status	1 (read)	00, 01(start-s 06(no range, 07, 08(limitec 17, 28(index)	129(respons	00, 01(start-s 17, 28(index see note 1)

OBJECT			REQUEST (Slave will parse)		RESPONSE (Master must parse)	
Object Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
41	2	16-Bit Analog Output Block	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, no)	00, 01 (start-s) 17, 28 (index)	129 (response)	echo of request
41	3	short floating point Analog Output Block	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, no)	00, 01 (start-s) 17, 28 (index)	129 (response)	echo of request
50	0	Time and Date	1 (read)	00, 01 (start-s) 06 (no range, 07, 08 (limited 17, 28 (index)	129 (response)	00, 01 (start-s) 17, 28 (index see note 1)
50	1	Time and Date	1 (read)  2 (write)	00, 01 (start-s) 06 (no range, 06 (no range, 17, 28 (index) 07 (limited qty 08 (limited qty	129 (response)	00, 01 (start-s) 17, 28 (index)
52	2	Time Delay Fine			129 (response)	07 (limited qty (qty = 1)
60	0	Class 0, 1, 2, and 3 Data	1 (read)	06 (no range,		
60	1	Class 0 Data	1 (read) 22 (assign c	06 (no range,		
60	2	Class 1 Data	1 (read) 22 (assign c	06 (no range, 07, 08 (limited		
60	3	Class 2 Data	1 (read) 22 (assign c	06 (no range, 07, 08 (limited		
60	4	Class 3 Data	1 (read) 22 (assign c	06 (no range, 07, 08 (limited		
80	1	Internal Indications	2 (write) (see note 2)	00 (start-stop) 01 (start-stop)		

**Note 1:** A Default variation refers to the variation responded when variation 0 is requested and/or in class 0, 1, 2, or 3 scans. Default variations are configurable from Easy Connect configuration utility.

**Note 2:** For static (non-change-event) objects, qualifiers 17 or 28 are only responded when a request is sent with qualifiers 17 or 28, respectively. Otherwise, static object requests sent with qualifiers 00, 01, 06, 07, or 08, will be responded with qualifiers 00 or 01. (For change-event objects, qualifiers 17 or 28 are always responded.)

**Note 3:** Writes of Internal Indications are only supported for index 7 (Restart IIN1-7)

## 4. DNP V3.0 Point List

The tables below identify all the details of points supported by KALKI protocol Gateway /Gatewaylite.

### 4.1. BinaryInput Points

The binary input event buffer size is set as 100 by default in EasyConnect configuration utility. However this can be changed to required value. The event storage mode is also configurable as “Sequence of events” or “most recent”. If sequence of event is configured all the events will get reported. Otherwise the last event will overwrite the previous event at the same point.

<b>Binary Input Points</b>		
Static (Steady-State) Object Number: <b>1</b>		
Change Event Object Number: <b>2</b>		
Request Function Codes supported: <b>1 (read), 22 (assign class)</b>		
Static Variation reported when variation 0 requested: <b>Object 1 default variation configured (def = 2)</b>		
Change Event Variation reported when variation 0 requested: <b>Object 2 default variation configured (def = 2)</b>		
Point Index	Name/Description	Default Change Event Assigned Class (1, 2, 3 or none)
Configurable	Configurable	1

### 4.2. Binary Output Status Points and Control Relay Output Blocks

The following table lists both the Binary Output Status Points (Object 10) and the Control Relay Output Blocks (Object 12).

While Binary Output Status Points are included here for completeness, DNP 3.0 Masters does not often poll them. It is recommended that Binary Output Status points represent the most recent DNP “commanded” value for the corresponding Control Relay Output Block point. Because many, if not most, Control Relay Output Block points are controlled through pulse mechanisms, the value of the output status may in fact be meaningless. Binary Output Status points are not recommended to be included in class 0 polls.

As an alternative, it is recommended that “actual” status values of Control Relay Output Block points be looped around and mapped as Binary Inputs. (The “actual” status value, as opposed to the “commanded” status value, is the value of the actuated control. For example, a DNP control command may be blocked through hardware or software mechanisms; in this case, the actual status value would indicate the control failed because of the blocking. Looping Control Relay Output Block actual status values as Binary Inputs has several advantages:

- it allows actual statuses to be included in class 0 polls,
- it allows change event reporting of the actual statuses, which is a more efficient and time-accurate method of communicating control values,
- and it allows reporting of time-based information associated with controls, including any delays before controls are actuated, and any durations if the controls are pulsed.

The default select/control buffer size is large enough to hold 10 of the largest select requests possible.

<b>Binary Output Status Points</b> Object Number: <b>10</b> Request Function Codes supported: <b>1 (read)</b> Default Variation reported when variation 0 requested: <b>Object 10 default variation configured (def = 2)</b>		
<b>Control Relay Output Blocks</b> Object Number: <b>12</b> Request Function Codes supported: <b>3 (select), 4 (operate), 5 (direct operate), 6 (direct operate, noack)</b>		
Point Index	Name/Description	Supported Control Relay Output Block Fields
Configurable	Configurable	All

### 4.3. Analog Inputs

The following table lists Analog Inputs (Object 30). It is important to note that 16-bit and 32-bit variations of Analog Inputs, Analog Output Control Blocks, and Analog Output Statuses are transmitted through DNP as signed numbers.

The “Default Deadband,” and the “Default Change Event Assigned Class” columns are used to represent the absolute amount by which the point must change before an analog change event will be generated, and once generated in which class poll (1, 2, 3, or none) will the change event be reported.

The default analog input event buffer size in EasyConnect is set 100, which can be changed.

<b>Analog Inputs</b> Static (Steady-State) Object Number: <b>30</b> Change Event Object Number: <b>32</b> Request Function Codes supported: <b>1 (read)</b> Static Variation reported when variation 0 requested: <b>Object 30 default variation configured (def = 2)</b> Change Event Variation reported when variation 0 requested: <b>Object 32 default variation configured (def = 2)</b>			
Point Index	Name/Description	Default Deadband	Default Change Event Assigned Class (1, 2, 3 or none)
Configurable	Configurable	0	2

### 4.4. Analog Output Status Points and Analog Output Control Blocks

The following table lists both the Analog Output Status Points (Object 40) and the Analog Output Control Blocks (Object 41).

While Analog Output Status Points are included here for completeness, DNP 3.0 Masters does not often poll them. It is recommended that Analog Output Status points represent the most recent DNP “commanded” value for the corresponding Analog Output Control Block point. Analog Output Status points are not recommended to be included in class 0 polls.

As an alternative, it is recommended that “actual” status values of Analog Output Control Block points be looped around and mapped as Analog Inputs. (The “actual” status value, as opposed to the “commanded” status value, is the value of the actuated control.) For example, a DNP control command may be blocked through hardware or software mechanisms; in this case, the actual status value would indicate the

control failed because of the blocking. Looping Control Relay Output Block actual status values as Analog Inputs has several advantages:

- it allows actual statuses to be included in class 0 polls,
- it allows change event reporting of the actual statuses, which is a more efficient method of communicating control values,
- and, if analog change events with time variations are supported by the DNP master, it allows reporting of time-based information associated with controls, including delays before the controls are actuated.

The default select/control buffer size is large enough to hold 10 of the largest select requests possible.

<b>Analog Output Status Points</b> Object Number: <b>40</b> Request Function Codes supported: <b>1 (read)</b> Default Variation reported when variation 0 requested: <b>Object 40 default variation configured (def = 2)</b>	
<b>Analog Output Blocks</b> Object Number: <b>41</b> Request Function Codes supported: <b>3 (select), 4 (operate), 5 (direct operate), 6 (direct operate, noack)</b>	
<b>Point Index</b>	<b>Name/Description</b>
Configurable	Configurable

## 5. Configuration Details

Configuration of KSGL / KPG is done through the configuration utility named “EasyConnect”. The DNP3.0 serial slave configuration is divided into 3 parts – channel configuration, node configuration & configuration of profile.

### 5.1. Channel Configurations

Channel configuration involves configuration of the following parameters.

#### 5.1.1. ChannelNumber

*Description:* Indicates the Unique Identification Number For Channel

*Default:* Depends up on the order of creation

*Range:* 1-4,8,16 (Depends upon converter model)

#### 5.1.2. Channel State

*Description:* Indicates Whether the Channel is active or not.

*Default:* 1

Range: 0 or 1.

### **5.1.3. Channel Type**

*Description:* Indicates the type of Channel

*Default:* RS232

*Range:* RS232/RS485

### **5.1.4. Baud**

*Description:* Indicates the baud Rate

*Default:* 9600

*Range:* 600-19200

### **5.1.5. Data Bits**

*Description:* Indicates the number of Data Bits

*Default:* 8

*Range:* 7,8

### **5.1.6. Stop Bits**

*Description:* Indicates the number of Stop Bits

*Default:* 1

*Range:* 1,2

### **5.1.7. Parity**

*Description:* Indicates the parity Type

*Default:* Even

*Range:* Even, Odd, None

### 5.1.8. Port

*Description:* Indicates the name of the Port

*Default:* Com1.

*Range:* Com1-16.

### 5.1.9. Flow Control

*Description:* Indicates the type of flow control.

*Default:* None

*Range:* None, Hardware, Software

### 5.1.10. CTS Delay

*Description:* Indicates the delay between rising of CTS signal by the modem and starting of a new transmission

*Default:* 30

*Range:* 0-100milliseconds

### 5.1.11. Post Transmission Delay

*Description:* Indicates the delay between releasing of RTS and end of a transmission.

*Default:* 0 milliseconds

*Range:* 0-100 milliseconds

### 5.1.12. Time Out

*Description:* Indicates the application layer incremental timeout in milliseconds

*Default:* 30000 milliseconds

*Range:* 0-100000 milliseconds

### **5.1.13. Frame Timeout**

*Description:* Indicates the maximum time to allow receiving an entire frame.

*Default:* 15000 milliseconds

*Range:* 0-50000 milliseconds

### **5.1.14. Confirm Timeout**

*Description:* Maximum time to wait for a link layer confirmation.

*Default:* 2000 milliseconds

*Range:* 0-50000 milliseconds

### **5.1.15. Link Layer Retries**

*Description:* Indicates the maximum number of retries.

*Default:* 3

*Range:* 0-10

### **5.1.16. Link Confirm Mode**

*Description:* Specifies when to ask for link layer confirmations.

*Default:* Always.

*Range:* Never, Always

### **5.1.17. Offline Poll Period**

*Description:* How often slave will try to reopen channel when it is offline (in milliseconds).

*Default:* 60000

*Range:* 30000 - 60000

## **5.2. Node Configurations**

### **5.2.1. Node Number**

*Description:* Indicates the Unique Identification Number For Node

*Default:* Depends up on the order of creation.

*Range:* 1-64,128,256(Depends upon converter model).

### **5.2.2. Node State**

*Description:* Indicates whether Node is active or not.

*Default:* 1

*Range:* 0 or 1.

### **5.2.3. Slave Address**

*Description:* Address of the Slave Device (address of DNP3 slave inside the converter)

*Default:* 4

*Range:* 0-65534

### **5.2.4. Master Address**

*Description:* Address of the external DNP3 master

*Default:* 1

*Range:* 0-65534

### **5.2.5. Link Status Period**

*Description:* How often this device should perform link status requests

*Default:* 60000

*Range:* 300000-60000

### 5.2.6. Validate Master Address

*Description:* Should this slave check the master address in received requests

*Default:* 0

*Range:* 0 or 1

### 5.2.7. Multi Fragment Allowed

*Description:* Can this device send multi-fragment responses

*Default:* 1

*Range:* 0 or 1

### 5.2.8. Multi Fragment Confirm

*Description:* Should this slave request for confirms to intermediate fragments

*Default:* 1

*Range:* 0 or 1

### 5.2.9. Set Need Time IIN

*Description:* Should this slave set the Need Time IIN when clock valid period expires. This will cause Master to send Time Synchronization

*Default:* 1

*Range:* 0 or 1

#### 5.2.10. Clock Valid

*Description:* How long to allow between clock syncs before setting Need Time IIN bit

*Default:* 10

*Range:* 0-1440 minutes

#### 5.2.11. Select Time Out

*Description:* How long to allow between a select and the corresponding execute

*Default:* 2

*Range:* 1-180 s

#### 5.2.12. Allow Multi-CROB requests

*Description:* Should this device allow multiple CROB commands in same request from master

*Default:* 0

*Range:* 0 or 1

#### 5.2.13. Unsol Allowed

*Description:* Should this slave generate unsolicited responses

*Default:* 0

*Range:* 0 or 1

#### 5.2.14. Unsol Class Mask

*Description:* Which event classes should be allowed to generate Unsolicited Responses. This initial setting can be over-ridden by Master.

*Default:* 0

*Range:* 0, 1, 2, 3, 1&2, 1&3, 2&3, 1&2&3

### 5.2.15. Unsol Class1 Max Events

*Description:* How many class1 events should be queued before generating an Unsolicited Response

*Default:* 1

*Range:* 1-100

### 5.2.16. Unsol Class2 Max Events

*Description:* How many class2 events should be queued before generating an Unsolicited Response

*Default:* 3

*Range:* 1-100

### 5.2.17. Unsol Class3 Max Events

*Description:* How many class3 events should be queued before generating an Unsolicited Response

*Default:* 5

*Range:* 1-100

### 5.2.18. Unsol Class1 Max Delay

*Description:* How long after the first Class1 event is received should this slave wait before generating an Unsol

*Default:* 1

*Range:* 0-60 seconds

### 5.2.19. Unsol Class2 Max Delay

*Description:* How long after the first Class2 event is received should this slave wait before generating an Unsol

*Default:* 3

*Range:* 0-60 seconds

### 5.2.20. Unsol Class3 Max Delay

*Description:* How long after the first Class3 event is received should this slave wait before generating an Unsol

*Default:* 5

*Range:* 0-60 seconds

### 5.2.21. Unsol Max Retries

*Description:* How many times should this slave resend Unsols before declaring the session offline

*Default:* 3

*Range:* 1-10

### 5.2.22. Unsol Retry Delay

*Description:* How long this slave should wait for a confirm to an Unsol before retrying

*Default:* 15

*Range:* 1-60 seconds

### 5.2.23. Unsol Offline Retry Delay

*Description:* How long this slave should wait for a confirm to an Unsol before retrying – when this session is already declared offline

*Default:* 60

*Range:* 1-300 seconds

### 5.2.24. Obj 1 Default Variation

*Description:* Which variation to report data when no specific variation requested

*Default:* 2

*Range:* 1-2

#### 5.2.25. Obj 02 Default Variation

*Description:* Which variation to report data when no specific variation requested

*Default:* 2

*Range:* 1-3

#### 5.2.26. Obj 10 Default Variation

*Description:* Which variation to report data when no specific variation requested

*Default:* 2

*Range:* 1-2

#### 5.2.27. Obj 30 Default Variation

*Description:* Which variation to report data when no specific variation requested

*Default:* 2

*Range:* 1-6

#### 5.2.28. Obj 32 Default Variation

*Description:* Which variation to report data when no specific variation requested

*Default:* 2

*Range:* 1-8

#### 5.2.29. Obj 34 Default Variation

*Description:* Which variation to report data when no specific variation requested

*Default:* 2

*Range:* 1-3

### 5.2.30. Obj 40 Default Variation

*Description:* Which variation to report data when no specific variation requested

*Default:* 2

*Range:* 1-4

### 5.2.31. Number of Binary Input Events

*Description:* Max count of Events stored

*Default:* 0-2000

*Range:* 100

### 5.2.32. BI Event storage Mode

*Description:* In SOE Mode all Events are stored and in Most Recent Mode an already stored event of a particular points get over written by any latest event on the same point.

*Default:* Sequence Of Events

*Range:* Sequence of Events /Most Recent

### 5.2.33. Number of Analog Input Events

*Description:* Max count of Events stored

*Default:* 100

*Range:* 0-2000

### 5.2.34. AI Event storage Mode

*Description:* In SOE Mode all Events are stored and in Most Recent Mode an already stored event of a particular points get over written by any latest event on the same point.

*Default:* Sequence Of Events

*Range:* Sequence of Events /Most Recent

### **5.3. Profile Attributes**

#### **5.3.1. Object Types**

You can configure the different object types of DNP3.0 here. The following are major object types available for configuration.

- Binary Inputs
- Analog Inputs
- Binary Output Status
- Analog Output Status
- Binary Output Command
- Analog Output Command

Details are given under section 4.

#### **5.3.2. Point Number**

The point number represents the index of specific object type.

#### **5.3.3. No of Points**

This specifies the total number of points starting from the specific index.

## 6. Mapping Details from other protocols: -

This section gives detailed idea of the data types in other master protocols, which can be mapped, to specific DNP3.0 slave types.

<b>DNP3.0 slave Types</b>	<a href="#"><u>DN-T1</u></a> <a href="#"><u>DN-T3</u></a>	<a href="#"><u>DN-T2</u></a> <a href="#"><u>DN-T4</u></a>	<a href="#"><u>DN-T5</u></a>	<a href="#"><u>DN-T6</u></a>
IEC101/ 104 master types	<a href="#"><u>14-M1</u></a> <a href="#"><u>14-M2</u></a>	<a href="#"><u>14-M3</u></a> <a href="#"><u>14-M4</u></a> <a href="#"><u>14-M5</u></a> <a href="#"><u>14-M6</u></a> <a href="#"><u>14-M7</u></a> <a href="#"><u>14-M8</u></a>	<a href="#"><u>14-C1</u></a> <a href="#"><u>14-C2</u></a> <a href="#"><u>14-C3</u></a>	<a href="#"><u>14-C4</u></a> <a href="#"><u>14-C5</u></a> <a href="#"><u>14-C6</u></a> <a href="#"><u>14-C7</u></a>
IEC103 master types	<a href="#"><u>103-T1</u></a> <a href="#"><u>103-T2</u></a>	<a href="#"><u>103-T3</u></a> <a href="#"><u>103-T4</u></a> <a href="#"><u>103-T9</u></a>	<a href="#"><u>103-T20</u></a>	--
Modbus master types	<a href="#"><u>MB-T1</u></a> <a href="#"><u>MB-T2</u></a> <a href="#"><u>MB-T3</u></a> <a href="#"><u>MB-T4</u></a>	<a href="#"><u>MB-T5</u></a> <a href="#"><u>MB-T6</u></a>	<a href="#"><u>MB-T7</u></a> <a href="#"><u>MB-T8</u></a> <a href="#"><u>MB-T9</u></a> <a href="#"><u>MB-T10</u></a>	<a href="#"><u>MB-T11</u></a> <a href="#"><u>MB-T12</u></a>
DNP3.0 master types	<a href="#"><u>DN-T1</u></a> <a href="#"><u>DN-T3</u></a>	<a href="#"><u>DN-T2</u></a> <a href="#"><u>DN-T4</u></a>	<a href="#"><u>DN-T5</u></a>	<a href="#"><u>DN-T6</u></a>
SPA master types	<a href="#"><u>SP-T1</u></a> <a href="#"><u>SP-T2</u></a>	<a href="#"><u>SP-T3</u></a> <a href="#"><u>SP-T4</u></a>	<a href="#"><u>SP-T5</u></a> <a href="#"><u>SP-T6</u></a>	<a href="#"><u>SP-T7</u></a>
Courier master types	<a href="#"><u>CR-T1</u></a>	<a href="#"><u>CR-T3</u></a>	<a href="#"><u>CR-T4</u></a>	<a href="#"><u>CR-T6</u></a>

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**IEC101/104 Type Details**

<b>IEC101/104 types</b>	<b>Type Details</b>
14_M1	Single Indication
14_M2	Double Indication
14_M3	Step position information
14_M4	Measured value, normalized value
14_M5	Measured value, Scaled value
14_M6	Measured value, short floating point value
14_M7	Integrated totals
14_M8	Bitstring of 32 bit
14_C1	Single command
14_C2	Double command
14_C3	Regulating step command
14_C4	Set point command, normalised value
14_C5	Set point command, Scaled value
14_C6	Set point command, short floating point value
14_C7	Set point command, Bitstring of 32 bit

<b>Modbus Type Details</b>		
<b>Modbus types</b>	<b>Type Details</b>	<b>Supported Formats</b>
MB-T1	Single Indication, Read Coil status	NA
MB-T2	Single Indication, Read Discrete inputs	NA
MB-T3	Double Indication, Read Coil status	NA
MB-T4	Double Indication, Read Discrete inputs	NA
MB-T5	Analog I/P, Read Input Registers	NA
MB-T6	Analog I/P, Read Holding Registers	Signed Single Register Unsigned Single Register Signed 32 bit Register ( lsw – msw ) Signed 32 bit Register ( msw – lsw ) Unsigned 32 bit Register ( lsw – msw ) Unsigned 32 bit Register ( msw – lsw ) Float ( lsw – msw ) Float ( msw – lsw ) Double
MB-T7	Single Command, Force single coil	NA
MB-T8	Single Command, Force multiple coils	NA
MB-T9	Double Command, Force single coil	NA
MB-T10	Double Command, Force multiple coils	NA
MB-T11	Analog O/P, Force single register	Signed Single Register Unsigned Single Register
MB-T12	Analog O/P, Force multiple registers	Signed Single Register Unsigned Single Register Signed 32 bit Register ( lsw – msw ) Signed 32 bit Register ( msw – lsw ) Unsigned 32 bit Register ( lsw – msw ) Unsigned 32 bit Register ( msw – lsw ) Float ( lsw – msw ) Float ( msw – lsw )

<b>IEC103 Type Details</b>	
<b>IEC103 types</b>	<b>Type Details</b>
103-T1	Time Tagged Message (103 TYPE = 1)
103-T2	Time Tagged Message With Relative Time(103 TYPE = 2)
103-T3	Measurands I (103 TYPE = 3)
103-T4	Time Tagged Measurands with Relative Time. (103 TYPE = 4)
103-T5	Identification (103 TYPE = 5)
103-T9	Measurands II (103 TYPE = 9)
103-T20	Write general commands (103 TYPE = 20)
103-T21	Directory

<b>DNP3.0 Type Details</b>	
<b>DNP3.0 types</b>	<b>Type Details</b>
DN-T1	Binary Input
DN-T2	Analog Input
DN-T3	Binary Output Status
DN-T4	Analog Output Status
DN-T5	Binary Output Command
DN-T6	Analog Output Command

<b>SPA Type Details</b>				
<b>SPA types</b>	<b>Type Details</b>	<b>Supported Data Types</b>	<b>Supported Data Formats</b>	<b>Update Methods</b>
SP-T1	Single Indications	I, O, S, V, M, C	Bits, Hex, Real, Long Int	Polling , Events , polling & events
SP-T2	Double Indications	I, O, S, V, M, C	Bits, Hex, Real, Long Int	Polling , Events , polling & events
SP-T3	Analog Inputs	I, O, S, V, M, C	Bits, Hex, Real, Long Int	Polling
SP-T4	Pulse Counters	I, O, S, V, M, C	Bits, Hex, Real, Long Int	Polling
SP-T5	Object Commands	I, O, S, V, M, C	Bits, Hex, Real, Long Int	NA
SP-T6	Double Commands	I, O, S, V, M, C	Bits, Hex, Real, Long Int	NA
SP-T7	Analog Outputs	I, O, S, V, M, C	Bits, Hex, Real, Long Int	NA

<b>Courier Type Details</b>			
<b>Courier types</b>	<b>Type Details</b>	<b>Supported Data Formats</b>	<b>Update Methods</b>
CR-T1	Single Indications	NA	Polling , Events , polling & events
CR-T2	Double Indications	NA	Polling , Events , polling & events
CR-T3	Analog Inputs	UnsignedInteger (1Byte) – 24H UnsignedInteger (2Bytes) – 25H UnsignedInteger (4Bytes) – 26H SignedInteger (1Byte) – 28H SignedInteger (2Bytes) – 29H SignedInteger (4Bytes) – 2AH CourierNumber (4Bytes) – 2CH Extended Courier (6Bytes) --30 H IEEE floating Format (4Bytes)--34 H	Polling
CR-T4	Single Commands	Indexed String Courier Number	NA
CR-T5	Double Commands	Indexed String Courier Number Two bits setting command	NA
CR-T6	Analog Outputs	UnsignedInteger (1Byte) – 24H UnsignedInteger (2Bytes) – 25H UnsignedInteger (4Bytes) – 26H SignedInteger (1Byte) – 28H SignedInteger (2Bytes) – 29H SignedInteger (4Bytes) – 2AH CourierNumber (4Bytes) – 2CH Extended Courier (6Bytes) --30 H IEEE floating Format (4Bytes)--34 H	NA