



Reliance SCADA/HMI

DNP3 Communication Driver Interoperability Guide

Introduction

The purpose of this document is to describe specific configuration and interoperability information for an implementation of the Distributed Network Protocol (DNP), Version 3.0, using the Reliance SCADA system's DNP3 Communication Driver. This document, in conjunction with the DNP 3.0 Basic 4 Document Set and the DNP Subset Definitions Document, provides complete information on how to communicate via the DNP 3.0 protocol. This implementation of DNP 3.0 is fully compliant with DNP 3.0 Subset Definition Level 3, and contains significant functionality beyond Subset Level 3.

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. While it is referred to in the DNP 3.0 Subset Definitions as a "Document", it is in fact a table, and only a component of a total interoperability guide. The table, in combination with the Implementation Table provided in Section 2 (beginning on page 7), and the Point List Tables provided in Section 3 (beginning on page 13), should provide a complete configuration/interoperability guide for communication using Reliance's DNP3 Communication Driver.

DNP V3.00 DEVICE PROFILE DOCUMENT	
This document must be accompanied by a table having the following headings:	
Object group	Request function codes
Object variation	Request qualifiers
Object name (optional)	Response function codes
	Response qualifiers
Vendor name: GEOVAP	
Device Name: DNP3 Communication Driver	
Highest DNP level supported: For requests: Level 3 For responses: Level 3	Device function: <input checked="" type="checkbox"/> Master <input type="checkbox"/> Slave
Notable objects, functions, and/or qualifiers supported in addition to the highest DNP levels supported (the complete list is described in the attached table):	
Maximum data link frame size (octets): Transmitted: 292 Received: 292	Maximum application fragment size (octets): Transmitted: 2048 Received: 2048
Maximum data link re-tries: <input type="checkbox"/> None <input type="checkbox"/> Fixed at ____ <input checked="" type="checkbox"/> Configurable from 1 to 65535	Maximum application layer re-tries: <input checked="" type="checkbox"/> None <input type="checkbox"/> Configurable
Requires data link layer confirmation: <input type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Sometimes If "Sometimes", when? _____ <input checked="" type="checkbox"/> Configurable If "Configurable", how? <u>Device parameter "Require confirmation"</u>	

Requires application layer confirmation:

<input type="checkbox"/>	Never	
<input type="checkbox"/>	Always (not recommended)	
<input type="checkbox"/>	When reporting Event Data (Slave devices only)	
<input type="checkbox"/>	Sometimes If "Sometimes", when? _____	
<input checked="" type="checkbox"/>	Configurable If "Configurable", how? _____	Device parameter "Require confirmation"

Timeouts while waiting for:

Data link confirm:	<input type="checkbox"/> None	<input type="checkbox"/> Fixed at	<input type="checkbox"/> Variable	<input checked="" type="checkbox"/> Configurable
Complete appl. fragment:	<input type="checkbox"/> None	<input type="checkbox"/> Fixed at	<input type="checkbox"/> Variable	<input checked="" type="checkbox"/> Configurable
Application confirm:	<input type="checkbox"/> None	<input type="checkbox"/> Fixed at	<input type="checkbox"/> Variable	<input checked="" type="checkbox"/> Configurable
Complete appl. response	<input type="checkbox"/> None	<input checked="" type="checkbox"/> Fixed at 60 s	<input type="checkbox"/> Variable	<input type="checkbox"/> Configurable

Others _____

Attach explanation if "Variable" or "Configurable" was checked for any timeout:
Timeout of Data link confirm, Complete appl. fragment, and Application confirm is the same and configurable as the "Communication Timeout" parameter.

Sends/Executes control operations:

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

Attach explanation if "Sometimes" or "Configurable" was checked for any operation.

Fill out the following item for master devices only

Expects binary input change events:

- | | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Either time-tagged or non-time-tagged for a single event |
| <input type="checkbox"/> | Both time-tagged and non-time-tagged for a single event |
| <input type="checkbox"/> | Configurable (attach explanation) |

Explanation:

As used throughout this document, the term "Configurable" means that the particular parameter or parameters can be assigned values using Reliance's development environment (Reliance Design).

The following implementation table is a copy of the level 3 implementation table found in the DNP V3.0 Subset Definitions Document.

OBJECT			REQUEST (slave will parse)		RESPONSE (master will parse)	
Obj.	Var.	Description	Func. Codes (dec)	Qual. Codes (hex)	Func. Codes (dec)	Qual. Codes (hex)*
1	0	Binary Input – All Variations				
1	1	Binary Input	1	06	129,130	00,01,17,28
1	2	Binary Input with Status	1	06	129,130	00,01,17,28
2	0	Binary Input Change – All Variations				
2	1	Binary Input Change without Time	1	06	129,130	00,01,17,28
2	2	Binary Input Change with Time	1	06	129,130	00,01,17,28
2	3	Binary Input Change with Relative Time	1	06	129,130	00,01,17,28
10	0	Binary Output – All Variations				
10	1	Binary Output	1	06	129,130	00,01,17,28
10	2	Binary Output Status with Flag	1	06	129,130	00,01,17,28
11	0	Binary Output Change – All Variations				
11	1	Binary Output Change Status	1	06	129,130	00,01,17,28
11	2	Binary Output Change Status with Time	1	06	129,130	00,01,17,28
12	0	Control Block – All Variations				
12	1	Control Relay Output Block				
12	2	Pattern Control Block				
12	3	Pattern Mask				
20	0	Binary Counter – All Variations				
20	1	32-Bit Binary Counter	1	06	129,130	00,01,17,28
20	2	16-Bit Binary Counter	1	06	129,130	00,01,17,28
20	3	32-Bit Delta Counter	1	06	129,130	00,01,17,28
20	4	16-Bit Delta Counter	1	06	129,130	00,01,17,28
20	5	32-Bit Binary Counter without Flag	1	06	129,130	00,01,17,28

20	6	16-Bit Binary Counter without Flag	1	06	129,130	00,01,17,28
20	7	32-Bit Delta Counter without Flag	1	06	129,130	00,01,17,28
20	8	16-Bit Delta Counter without Flag	1	06	129,130	00,01,17,28
21	0	Frozen Counters – All Variations				
21	1	32-Bit Frozen Counter	1	06	129,130	00,01,17,28
21	2	16-Bit Frozen Counter	1	06	129,130	00,01,17,28
21	3	32-Bit Frozen Delta Counter	1	06	129,130	00,01,17,28
21	4	16-Bit Frozen Delta Counter	1	06	129,130	00,01,17,28
21	5	32-Bit Frozen Counter with Time of Freeze	1	06	129,130	00,01,17,28
21	6	16-Bit Frozen Counter with Time of Freeze	1	06	129,130	00,01,17,28
21	7	32-Bit Frozen Delta Cntr with Time of Freeze	1	06	129,130	00,01,17,28
21	8	16-Bit Frozen Delta Cntr with Time of Freeze	1	06	129,130	00,01,17,28
21	9	32-Bit Frozen Counter without Flag	1	06	129,130	00,01,17,28
21	10	16-Bit Frozen Counter without Flag	1	06	129,130	00,01,17,28
21	11	32-Bit Frozen Delta Counter without Flag	1	06	129,130	00,01,17,28
21	12	16-Bit Frozen Delta Counter without Flag	1	06	129,130	00,01,17,28
22	0	Counter Change Event – All Variations				
22	1	32-Bit Counter Change Event without Time	1	06	129,130	00,01,17,28
22	2	16-Bit Counter Change Event without Time	1	06	129,130	00,01,17,28
22	3	32-Bit Delta Cntr Change Event without Time	1	06	129,130	00,01,17,28
22	4	16-Bit Delta Cntr Change Event without Time	1	06	129,130	00,01,17,28
22	5	32-Bit Counter Change Event with Time	1	06	129,130	00,01,17,28
22	6	16-Bit Counter Change Event with Time	1	06	129,130	00,01,17,28
22	7	32-Bit Delta Counter Change Event with Time	1	06	129,130	00,01,17,28

22	8	16-Bit Delta Counter Change Event with Time	1	06	129,130	00,01,17,28
23	0	Frozen Counter Events – All Variations				
23	1	32-Bit Frozen Counter Event without Time	1	06	129,130	00,01,17,28
23	2	16-Bit Frozen Counter Event without Time	1	06	129,130	00,01,17,28
23	3	32-Bit Frozen Delta Cntr Event without Time	1	06	129,130	00,01,17,28
23	4	16-Bit Frozen Delta Cntr Event without Time	1	06	129,130	00,01,17,28
23	5	32-Bit Frozen Counter Event with Time	1	06	129,130	00,01,17,28
23	6	16-Bit Frozen Counter Event with Time	1	06	129,130	00,01,17,28
23	7	32-Bit Frozen Delta Counter Event with Time	1	06	129,130	00,01,17,28
23	8	16-Bit Frozen Delta Counter Event with Time	1	06	129,130	00,01,17,28
30	0	Analog Input – All Variations				
30	1	32-Bit Analog Input	1	06	129,130	00,01,17,28
30	2	16-Bit Analog Input	1	06	129,130	00,01,17,28
30	3	32-Bit Analog Input without Flag	1	06	129,130	00,01,17,28
30	4	16-Bit Analog Input without Flag	1	06	129,130	00,01,17,28
30	5	32-Bit FP Analog Input with Flag	1	06	129,130	00,01,17,28
30	6	64-Bit FP Analog Input with Flag	1	06	129,130	00,01,17,28
31	0	Frozen Analog Input – All Variations				
31	1	32-Bit Frozen Analog Input	1	06	129,130	00,01,17,28
31	2	16-Bit Frozen Analog Input	1	06	129,130	00,01,17,28
31	3	32-Bit Frozen An. Input with Time of Freeze	1	06	129,130	00,01,17,28
31	4	16-Bit Frozen An. Input with Time of Freeze	1	06	129,130	00,01,17,28
31	5	32-Bit Frozen Analog Input without Flag	1	06	129,130	00,01,17,28
31	6	16-Bit Frozen Analog Input without Flag	1	06	129,130	00,01,17,28

31	7	32-Bit FP Frozen Analog Input with Flag	1	06	129,130	00,01,17,28
31	8	64-Bit FP Frozen Analog Input with Flag	1	06	129,130	00,01,17,28
32	0	Analog Change Event – All Variations				
32	1	32-Bit Analog Change Event without Time	1	06	129,130	00,01,17,28
32	2	16-Bit Analog Change Event without Time	1	06	129,130	00,01,17,28
32	3	32-Bit Analog Change Event with Time	1	06	129,130	00,01,17,28
32	4	16-Bit Analog Change Event with Time	1	06	129,130	00,01,17,28
32	5	32-Bit FP Analog Change without Time	1	06	129,130	00,01,17,28
32	6	64-Bit FP Analog Change without Time	1	06	129,130	00,01,17,28
32	7	32-Bit FP Analog Change with Time	1	06	129,130	00,01,17,28
32	8	64-Bit FP Analog Change with Time	1	06	129,130	00,01,17,28
33	0	Frozen Analog Event – All Variations				
33	1	32-Bit Frozen Analog Change without Time	1	06	129,130	00,01,17,28
33	2	16-Bit Frozen Analog Change without Time	1	06	129,130	00,01,17,28
33	3	32-Bit Frozen Analog Change with Time	1	06	129,130	00,01,17,28
33	4	16-Bit Frozen Analog Change with Time	1	06	129,130	00,01,17,28
33	5	32-Bit FP Frozen Analog Change without Time	1	06	129,130	00,01,17,28
33	6	64-Bit FP Frozen Analog Change without Time	1	06	129,130	00,01,17,28
33	7	32-Bit FP Frozen Analog Change with Time	1	06	129,130	00,01,17,28
33	8	64-Bit FP Frozen Analog Change with Time	1	06	129,130	00,01,17,28
34	0	Analog Input Deadband				
34	1	16-bit Analog Input Deadband	1	06	129,130	00,01,17,28

34	2	32-bit Analog Input Deadband	1	06	129,130	00,01,17,28
34	3	32-Bit FP Analog Input Deadband	1	06	129,130	00,01,17,28
40	0	Analog Output Status – All Variations				
40	1	32-Bit Analog Output Status	1	06	129,130	00,01,17,28
40	2	16-Bit Analog Output Status	1	06	129,130	00,01,17,28
40	3	32-Bit FP Analog Output Status	1	06	129,130	00,01,17,28
40	4	64-Bit FP Analog Output Status	1	06	129,130	00,01,17,28
41	1	32-Bit Analog Output Block	1	06	129,130	00,01,17,28
41	2	16-Bit Analog Output Block	1	06	129,130	00,01,17,28
41	3	32-Bit FP Analog Output Block	1	06	129,130	00,01,17,28
41	4	64-Bit FP Analog Output Block	1	06	129,130	00,01,17,28
50	0	Time and Date – All Variations				
50	1	Time and Date	1	06	129,130	00,01,17,28
50	2	Time and Date with Interval				
50	3	Time and Date Last Recorded Time	1	06	129,130	00,01,17,28
51	0	Time and Date CTO – All Variations				
51	1	Time and Date CTO				
51	2	Unsynchronized Time and Date CTO				
52	0	Time Delay – All Variations				
52	1	Time Delay Coarse	1	06	129,130	00,01,17,28
52	2	Time Delay Fine	1	06	129,130	00,01,17,28
60	0	Not Defined				
60	1	Class 0 Data	1	06		
60	2	Class 1 Data	1	06		
60	3	Class 2 Data	1	06		
60	4	Class 3 Data	1	06		
70	1	File Identifier				
80	1	Internal Indications	1	06		
81	1	Storage Object				
82	1	Device Profile				

83	1	Private Registration Object				
83	2	Private Registration Object Descriptor				
90	1	Application Identifier				
100	1	Short Floating Point				
100	2	Long Floating Point				
100	3	Extended Floating Point				
101	1	Small Packed Binary-Coded Decimal				
101	2	Medium Packed Binary-Coded Decimal				
101	3	Large Packed Binary-Coded Decimal				
112	Obj Len	Virtual Terminal Output Block				
113	Obj Len	Virtual Terminal Event Data				
No Object						
No Object						

* Note: The communication driver should parse data in any combination of Qualifier Code. Only some of them were tested with a real device.