GE
Grid Solutions

DNP3 Client (DCA) for the Multifunction Controller Platform

Conformance Statement

Associated with NTEK-A023M-0CS

Version 1.00 Revision 0

Associated Software Release: Version 1.00

imagination at work

General

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Contents

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1. DNP3 Client Application on MCP – Device Profile Document

This document contains the Device Profile for the DNP3 Client Application on the MCP. Note that this Profile applies to the Client Application, not to the entire MCP.

DNP3 **Device Profile Document**	
Vendor Name: GE Grid Solutions	
Device Name: MCP DNP3 Client (both Serial and LAN).	
Highest DNP Level Supported: For Requests 2 For Responses 3	Device Function: ☒ Master ☐ 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): = Accepts many more qualifiers than specified in Level 3. = Can issue Enable Unsolicited Response for Class 1, 2 and 3 upon receipt of Null Unsolicited Response.	
Maximum Data Link Frame Size (octets): Transmitted ____292____ Received ____292____	Maximum Application Fragment Size (octets): Transmitted ___100 to 65535___ Received ___100 to 65535___

DNP3 **Device Profile Document**	
Maximum Data Link Re-tries: ☐ None ☐ Fixed at _____ ☒ Configurable, range 0 to 255 (config file)	Maximum Application Layer Re-tries: ☐ None ☐ Fixed at _____ ☒ Configurable, range 0 to 255 (config file)
Requires Data Link Layer Confirmation: ☐ Never ☐ Always ☐ Sometimes If 'sometimes', when? _____ ☒ Configurable If 'configurable', how? Using a config file	
Requires Application Layer Confirmation: ☒ Never ☐ Always (not recommended) ☐ When reporting Event Data (Slave devices only) ☐ When sending multi-fragment responses (Slave devices only) ☐ Sometimes If 'sometimes', when? _____ ☐ Configurable If 'configurable', how?	
Timeouts while waiting for: Data Link Confirm ☐ None ☐ Fixed at _____ ☐ Variable ☒ Configurable Complete Appl. Fragment ☐ None ☐ Fixed at _____ ☐ Variable ☒ Configurable Application Confirm ☒ None ☐ Fixed at _____ ☐ Variable ☐ Configurable Complete Appl. Response ☒ None ☐ Fixed at _____ ☐ Variable ☐ Configurable Others_____	

DNP3 Device Profile Document		
Sends/Executes Control Operations:		
WRITE Binary Outputs	☒ Never	☐ Always
	☐ Sometimes	☐ Configurable
SELECT/OPERATE	☐ Never	☐ Always
	☒ Sometimes	☐ Configurable
DIRECT OPERATE	☐ Never	☐ Always
	☒ Sometimes	☐ Configurable
DIRECT OPERATE - NO ACK	☐ Never	☐ Always
	☒ Sometimes	☐ Configurable
Count > 1	☐ Never	☐ Always
	☒ Sometimes	☐ Configurable
Pulse On	☐ Never	☐ Always
	☒ Sometimes	☐ Configurable
Pulse Off	☐ Never	☐ Always
	☒ Sometimes	☐ Configurable
Latch On	☐ Never	☐ Always
	☒ Sometimes	☐ Configurable
Latch Off	☐ Never	☐ Always
	☒ Sometimes	☐ Configurable
Queue	☒ Never	☐ Always
	☐ Sometimes	☐ Configurable
Clear Queue	☒ Never	☐ Always
	☐ Sometimes	☐ Configurable
The type of control operation issued depends on the local softw are executing and the configuration of the DNP3 Client. The Client can be configured to send all controls as Direct Operate, SBO, or Direct Operate No Ack. The Client can only send one control per DNP message.		
Reports Binary Input Change Events when no specific variation requested (Slave Only): ☒ Never ☐ Only time-tagged ☐ Only non time-tagged ☐ Configurable to send both, one or the other (attach explanation)		Reports time-tagged Binary Input Change Events when no specific variation requested: ☒ Never ☐ Binary Input change with time ☐ Binary Input change with Relative time ☐ Configurable (attach explanation)

<table>
<tr><th colspan="2">DNP3
Device Profile Document</th></tr>
<tr><td colspan="2">Master Expects Binary Input Change Events:
☒ Either time-tagged or non-time-tagged for a single event
☐ Both time-tagged and non-time-tagged for a single event
☐ Configurable (attach explanation)</td></tr>
<tr><td>Sends Unsolicited Responses (Slave Only):
☒ Never
☐ Configurable (attach explanation)
☐ Only certain objects
☐ Sometimes (attach explanation)
☐ ENABLE/DISABLE UNSOLICITED Function codes Supported</td><td>Sends Static Data in Unsolicited Responses (Slave Only):
☒ Never
☐ When Device Restarts
☐ When Status Flags Change
No other options are permitted.</td></tr>
<tr><td colspan="2">Sends Multi-Fragment Responses (Slave Only): ☐ Yes ☒ No</td></tr>
</table>

The Client sends to remote devices the subset of DNP3 objects, variations, qualifiers and function codes listed in Table 1.

Table 1: DNP3 Subset Sent by the Client under normal operation

Object			Request		
Obj	**Var**	**Description**	**Function Codes**	**Qual Codes (Hex)**	**Sent...**
1	0	Binary Input [All variations]	READ (1)	06	On a periodic basis as configured by the user
2	0	Binary Input Change [All variations]	READ (1)	06	On a periodic basis as configured by the user
10	1	Binary Output Status	READ (1)	06	On a periodic basis as configured by the user Sent immediately following the issue of a CROB command. Also sent (according to user config) if LOCAL IIN detected.
12	1	Control Relay Output Block	SELECT (3) OPERATE (4) DIRECT OPERATE (5) DIRECT OPERATE - NO ACK (6)	28	Only on demand.
20	0	Binary Accumulators [All Variations]	READ(1)	06	On a periodic basis as configured by the user
21	0	Frozen Accumulators [All Variations]	READ(1)	06	On a periodic basis as configured by the user
22	0	Accumulator Change Events [All Variations]	READ(1)	06	On a periodic basis as configured by the user
23	0	Frozen Accumulator Change Events [All Variations]	READ(1)	06	On a periodic basis as configured by the user
30	0,1,2,5,6	Analog Inputs [All Variations, 16 Bit, 32 Bit, Float, Long Float]	READ(1)	06	On a periodic basis as configured by the user
31	0	Frozen Analog Inputs [All Variations]	READ(1)	06	On a periodic basis as configured by the user
32	0	Analog Input Change Events [All Variations]	READ(1)	06	On a periodic basis as configured by the user

Object			Request		
Obj	Var	Description	Function Codes	Qual Codes (Hex)	Sent...
33	0	Frozen Analog Input Change Events [All Variations]	READ(1)	06	On a periodic basis as configured by the user
40	0,1,2	Analog Outputs [All Variations, 16 Bit, 32 Bit]	READ(1)	06	On a periodic basis as configured by the user
50	1	Time and Date	WRITE (2)	07 quant = 1	Regularly scheduled and/or in response to TIME SYNC REQUIRED IIN.
60	1	Class 0 Data	READ (1) ENABLE UNSOLICITED (20) DISABLE UNSOLICITED (21)	06	READ sent periodically, in response to various IINs. ENABLE/DISABLE UNSOLICITED sent as configured upon startup, and on receipt of a NULL Unsolicited Response
60	2	Class 1 Data	READ (1)	06	On periodic basis, to retrieve a configured number of class 1 events.
				06	On periodic basis, in response to various IINs.
			ENABLE UNSOLICITED (20) DISABLE UNSOLICITED (21)	06	ENABLE/DISABLE UNSOLICITED sent as configured upon startup, and on receipt of a NULL Unsolicited Response
60	3	Class 2 Data	READ (1)	08	On periodic basis, to retrieve a configured number of class 2 events.
				06	On periodic basis, in response to various IINs.
			ENABLE UNSOLICITED (20) DISABLE UNSOLICITED (21)	06	ENABLE/DISABLE UNSOLICITED sent as configured upon startup, and on receipt of a NULL Unsolicited Response
60	4	Class 3 Data	READ (1)	08	On periodic basis, to retrieve a configured number of class 3 events.
				06	On periodic basis, in response to various IINs.
			ENABLE UNSOLICITED (20) DISABLE UNSOLICITED (21)	06	ENABLE/DISABLE UNSOLICITED sent as configured upon startup, and on receipt of a NULL Unsolicited Response

Object			Request		
Obj	Var	Description	Function Codes	Qual Codes (Hex)	Sent...
80	1	Internal Indication	WRITE (2)	00	On receipt of a response containing the DEVICE RESTART bit set.
No object			DELAY MEASUREMENT (23)	None	On demand. If Auto Time Synchronization Enable is True it will also be sent in response to the TIME SYNC NEEDED IIN.

1.1 Profile of Normal Operation

The following table describes all the DNP3 objects, function codes, and qualifiers sent or received by the DNP3 Client software during normal operation. Each line of the table lists an object variation.

If the *Request* columns are blank, the Client does not send that object variation to remote devices. If the *Request* columns are non-blank, they indicate that the Client sends that object variation, with the specified function codes, under certain conditions.

The *Sent When* column describes these conditions, as follows:

D : The Client sends the request when a local software application **Demands** it do so.

O : The Client sends the request following a previous **Output** request.

I : The Client sends the request as a result of an **Internal Indication** from the remote device.

A : The Client sends the request **Automatically** as a part of its own operation, e.g. at start-up time, or if the local time changes.

P : The Client sends the request **Periodically**.

(C) : Following any of the above indicates the Client can be **Configured** to perform or not perform the request in this manner.

If the *Response* columns are blank, the Client does not accept the object variation and will discard any message containing that object variation. If the *Response* columns are non-blank, the Client accepts the object variation in responses, provided the remote device uses a valid function code and qualifier.

A "✓" in the *Uses* column means that the Client stores or forwards the data; otherwise, it ignores the object when parsing.

Table 2: DNP3 Subset Implemented by the Client

Object			Request			Response	
Obj	Var	Description	Func Codes (Dec)	Qual Codes (Hex)	Sent When ...	Func Codes (Dec)	Uses
1	0	Binary Input - All Variations	1	06	P(c)		
1	1	Binary Input				129, 130	✓
1	2	Binary Input With Status				129, 130	✓
2	0	Binary Input Change - All Variations	1	06	P(c)		
2	1	Binary Input Change Without Time				129, 130	✓
2	2	Binary Input Change With Time				129, 130	✓
2	3	Binary Input Change With Relative Time				129, 130	✓
10	0	Binary Output - All	1	06	P(c), I(c), O	129	
10	1	Binary Output					
10	2	Binary Output Status				129, 130	✓
12	0	Control Block - All Variations					
12	1	Control Relay Output Block	3, 4, 5, 6	28	D (c)	129	✓
12	2	Pattern Control Block					
12	3	Pattern Mask					
20	0	Binary Counter - All Variations	1, 7	06	P (C), O		
20	1	32-Bit Binary Counter				129, 130	✓
20	2	16-Bit Binary Counter				129, 130	✓
20	3	32-Bit Delta Counter				129, 130	✓
20	4	16-Bit Binary Counter				129, 130	✓
20	5	32-Bit Binary Counter Without Flag				129, 130	✓
20	6	16-Bit Binary Counter Without Flag				129, 130	✓
20	7	32-Bit Delta Counter Without Flag				129, 130	✓
20	8	16-Bit Delta Counter Without Flag				129, 130	✓
21	0	Frozen Counter - All Variations	1	06	P (C), O		
21	1	32-Bit Frozen Counter				129, 130	✓
21	2	16-Bit Frozen Counter				129, 130	✓

Object			Request			Response	
Obj	Var	Description	Func Codes (Dec)	Qual Codes (Hex)	Sent When ...	Func Codes (Dec)	Uses
21	3	32-Bit Frozen Delta Counter				129, 130	✓
21	4	16-Bit Frozen Delta Counter				129, 130	✓
21	5	32-Bit Frozen Counter With Time of Freeze				129, 130	✓
21	6	16-Bit Frozen Counter With Time of Freeze				129, 130	✓
21	7	32-Bit Frozen Delta Counter With Time of Freeze				129, 130	✓
21	8	16-Bit Frozen Delta Counter With Time of Freeze				129, 130	✓
21	9	32-Bit Frozen Counter Without Flag				129, 130	✓
21	10	16-Bit Frozen Counter Without Flag				129, 130	✓
21	11	32-Bit Frozen Delta Counter Without Flag				129, 130	✓
21	12	16-Bit Frozen Delta Counter Without Flag				129, 130	✓
22	0	Counter Change Event - All Variations	1	06	P(c)		
22	1	32-Bit Counter Change Event Without Time				129, 130	✓
22	2	16-Bit Counter Change Event Without Time				129, 130	✓
22	3	32-Bit Delta Counter Change Event Without Time				129, 130	✓
22	4	16-Bit Delta Counter Change Event Without Time				129, 130	✓
22	5	32-Bit Counter Change Event With Time				129, 130	✓
22	6	16-Bit Counter Change Event With Time				129, 130	✓
22	7	32-Bit Delta Counter Change Event With Time				129, 130	✓
22	8	16-Bit Delta Counter Change Event With Time				129, 130	✓
23	0	Frozen Counter Event - All Variations	1	06	P(c)		
23	1	32-Bit Frozen Counter Event Without Time				129, 130	✓
23	2	16-Bit Frozen Counter Event Without Time				129, 130	✓

Object			Request			Response	
Obj	Var	Description	Func Codes (Dec)	Qual Codes (Hex)	Sent When ...	Func Codes (Dec)	Uses
23	3	32-Bit Frozen Delta Counter Event Without Time				129, 130	✓
23	4	16-Bit Frozen Delta Counter Event Without Time				129, 130	✓
23	5	32-Bit Frozen Counter Event With Time				129, 130	✓
23	6	16-Bit Frozen Counter Event With Time				129, 130	✓
23	7	32-Bit Frozen Delta Counter Event With Time				129, 130	✓
23	8	16-Bit Frozen Delta Counter Event With Time				129, 130	✓
30	0	Analog Input - All Variations	1	06	P(c) O(c)		
30	1	32-Bit Analog Input	1	06	P(c)	129, 130	✓
30	2	16-Bit Analog Input	1	06	P(c)	129, 130	✓
30	3	32-Bit Analog Input Without Flag				129, 130	✓
30	4	16-Bit Analog Input Without Flag				129, 130	✓
30	5	32-Bit Floating Point Analog Input	1	06	P(c)	129, 130	✓
30	6	64-Bit Floating Point Analog Input	1	06	P(c)	129, 130	✓
31	0	Frozen Analog Input - All Variations	1	06	P(c)		
31	1	32-Bit Frozen Analog Input				129, 130	✓
31	2	16-Bit Frozen Analog Input				129, 130	✓
31	3	32-Bit Frozen Analog Input With Time of Freeze				129, 130	✓
31	4	16-Bit Frozen Analog Input With Time of Freeze				129, 130	✓
31	5	32-Bit Frozen Analog Input Without Flag				129, 130	✓
31	6	16-Bit Frozen Analog Input Without Flag				129, 130	✓
32	0	Analog Change Event - All Variations	1	06	P(c)		
32	1	32-Bit Analog Change Event Without Time				129, 130	✓

Object			Request			Response	
Obj	Var	Description	Func Codes (Dec)	Qual Codes (Hex)	Sent When ...	Func Codes (Dec)	Uses
32	2	16-Bit Analog Change Event Without Time				129, 130	✓
32	3	32-Bit Analog Change Event With Time				129, 130	✓
32	4	16-Bit Analog Change Event With Time				129, 130	✓
32	5	32-Bit Floating Point Analog Change Event without Time				129, 130	✓
32	6	64-Bit Floating Point Analog Change Event without Time				129, 130	✓
32	7	32-Bit Floating Point Analog Change Event with Time				129, 130	✓
32	8	64-Bit Floating Point Analog Change Event with Time				129, 130	✓
33	0	Frozen Analog Event - All Variations	1	06	P(c)		
33	1	32-Bit Frozen Analog Event Without Time				129, 130	✓
33	2	16-Bit Frozen Analog Event Without Time				129, 130	✓
33	3	32-Bit Frozen Analog Event With Time				129, 130	✓
33	4	16-Bit Frozen Analog Event With Time				129, 130	✓
40	0	Analog Output Status - All Variations	1	06	P(c), O		
40	1	32-Bit Analog Output Status	1	06	P(c)	129, 130	✓
40	2	16-Bit Analog Output Status	1	06	P(c)	129, 130	✓
41	0	Analog Output Block - All Variations					
41	1	32-Bit Analog Output Block					
41	2	16-Bit Analog Output Block					
50	0	Time and Date - All Variations					
50	1	Time and Date	2	07 where qnty = 1	I (C), P (C)	129, 130	
50	2	Time and Date With Interval				129, 130	
51	0	Time and Date CTO - All Variations					
51	1	Time and Date CTO				129, 130	✓

Object			Request			Response	
Obj	Var	Description	Func Codes (Dec)	Qual Codes (Hex)	Sent When ...	Func Codes (Dec)	Uses
51	2	Unsynchronized Time and Date CTO				129, 130	✓
52	0	Time Delay - All Variations					
52	1	Time Delay Coarse				129	✓
52	2	Time Delay Fine				129	✓
60	0						
60	1	Class 0 Data	1	06	P (C), I		
60	2	Class 1 Data	1	06	P (C), I, O(C)		
60	3	Class 2 Data	1	06	P (C), I, O(C)		
60	4	Class 3 Data	1	06	P (C) I, O(C)		
70	1	File Identifier				129	
80	1	Internal Indications	2	00	I	129, 130	✓
81	1	Storage Object				129, 130	
82	1	Device Profile				129, 130	
83	1	Private Registration Object				129, 130	
83	2	Private Registration Object Descriptor				129, 130	
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					
No Object			23		I (C)		

MODIFICATION RECORD

VERSION	REV.	DATE	AUTHOR	CHANGE DESCRIPTION
1.00	0	2nd May, 2019	G. LaMarre	Created.