GE
Grid Solutions

DNP3 Server (DPA) for the Multifunction Controller Platform

Conformance Statement

Associated with NTEK-A022M-0CS

Version 1.00 Revision 0

Associated Software Release: Version 1.00

imagination at work

General

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Contents

Tables

1. DNP3 Server Application on MCP - Device Profile Document

This document summarizes the MCP DNP3 Server implementation of the DNP3 protocol.

Several items in the Device Profile Document require additional explanation. All timeouts used by the DNP3 Server are configurable.

Each digital input point configured in the DNP3 Server is monitored for digital input change events. The user configures whether to report these as time-tagged or non-time-tagged digital events.

Counters rollover at whatever variation they are configured for. For example, if the counter is configured for a 32-bit variation, then it rolls over at 32 bits.

Unsolicited responses in the DNP3 Server are enabled and disabled for all classes (class 1, class 2 and class 3). However, if unsolicited responses are disabled in the configuration, unsolicited responses cannot be enabled or disabled during run-time via requests from the master station.

If unsolicited responses are enabled for one or more classes, the following IIN exceptions generate unsolicited responses: device restart, need time synchronization, and digital event buffer overflow.

The default variation of the static objects and change objects are configurable. When the Master requests data with all variations, the DNP3 Server responds with the configured variation. When the Master requests with a specific variation, the DNP3 Server responds with requested variation.

<table>
<tr><td colspan="2">DNP3
DEVICE PROFILE DOCUMENT
This document is accompanied by a table having the following headings:
Object Group | Request Function Codes | Response Function Codes
Object Variation | Request Qualifiers | Response Qualifiers
Object Name (optional)</td></tr>
<tr><td colspan="2">Vendor Name: GE Grid Solutions</td></tr>
<tr><td colspan="2">Device Name: MCP DNP3 Server (both Serial and LAN)</td></tr>
<tr><td>Highest DNP3 Level Supported:
For Requests Level 3
For Responses Level 3</td><td>Device Function:
□ Master ■ Outstation</td></tr>
<tr><td colspan="2">Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP3 Levels Supported (the complete list is described in the attached table):
<u>Optionally assigning class 1, 2 or 3 for each point.</u></td></tr>
</table>

Optionally forcing digital input points.

Optionally send Unsolicited messages for Indication or Indications and Events.

Time tagged available analog inputs returned.

Maximum Data Link Frame Size (octets):	Maximum Application Fragment Size (octets):
Transmitted 292_____	Transmitted 100 - 64K (configurable)
Received (must be 292)	Received 100 - 64K (must be > 249)
Maximum Data Link Re-tries:	Maximum Application Layer Re-tries:
□ None	□ None
□ Fixed at _____	■ Configurable, range __0_ to __32767___ (Fixed is not permitted)
■ Configurable, range __0_ to _255__	

Requires Data Link Layer Confirmation:

□ Never

□ Always

□ Sometimes If 'Sometimes', when? _____

■ Configurable If 'Configurable', how? User enables or disables confirm service.

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? User enables or disables confirm service.

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 _____

Attach explanation if 'Variable' or 'Configurable' was checked for any timeout

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

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:

□ 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)

FILL OUT THE FOLLOWING ITEMS FOR SLAVE DEVICES ONLY:

Reports Binary Input Change Events when no specific variation requested: □ Never □ Only time-tagged □ Only non-time-tagged ■ Configurable to 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)
Sends Unsolicited Responses: □ Never ■ Configurable (attach explanation) □ Only certain objects □ Sometimes (attach explanation) ■ ENABLE/DISABLE UNSOLICITED Function codes supported	Sends Static Data in Unsolicited Responses: □ Never ■ When Device Restarts ■ When Status Flags Change No other options are permitted.
Default Counter Object/Variation: □ No Counters Reported ■ Configurable (attach explanation) □ Default Object _____ Default Variation _____ □ Point-by-point list attached	Counters Roll Over at: □ No Counters Reported ■ Configurable (attach explanation) □ 16 Bits □ 32 Bits □ Other Value _____ □ Point-by-point list attached

Sends Multi-Fragment Responses: ■ Yes □ No

Table 1 explains which objects/variations are used with which Function Codes and Qualifier Codes by the MCP DNP3 Server implementation.

To understand the table, consider the third row of Table 1. This row specifies how object 1, variation 2 (Binary Input with Status) is accessed. To access this type of object, the DNP3 Server shall process a request using Function Code 1 (READ) with a Qualifier Code in the range of 00, 01, or 06. The DNP3 Server shall respond with Function Code 129 (RESPONSE), Qualifier Code 01. The DNP3 Server shall also support a request using Function 2 (WRITE).

Table 1 Objects/Variations/Qualifiers/Function Codes supported by the MCP DNP3 Server

Obj.	Var.	Description	Request Function Code	Request Qualifier Codes (Hexadecimal)	Response Function Code	Response Qualifier Codes (Hexadecimal)
1	0	BINARY INPUT-ALL VARIATIONS	1, 22	00, 01, 06	Not Used	Not Used
1	1	SINGLE-BIT BINARY INPUT	1	00, 01, 06	129	01
1	2	BINARY INPUT WITH STATUS	1	00, 01, 06	129	01
			2	00, 01	129	01
2	0	BINARY INPUT CHANGE - ALL VARIATIONS	1	06, 07, 08	Not Used	Not Used
2	1	BINARY INPUT CHANGE WITHOUT TIME	1	06, 07, 08	129, 130	28
2	2	BINARY INPUT CHANGE WITH TIME	1	06, 07, 08	129, 130	28
2	3	BINARY INPUT CHANGE WITH RELATIVE TIME	1	06, 07, 08	129, 130	28
10	0	BINARY OUTPUT - ALL VARIATIONS	1	00, 01, 06	Not Used	Not Used
10	1	BINARY OUTPUT	Not Used	Not Used	Not Used	Not Used
10	2	BINARY OUTPUT STATUS	1	00, 01, 06	129	01
12	0	CONTROL RELAY OUTPUT BLOCK - ALL VARIATIONS	Not Used	Not Used	Not Used	Not Used
12	1	CONTROL RELAY OUTPUT BLOCK	3, 4, 5, 6	17, 28	129	Echo of request qualifier codes
12	2	PATTERN CONTROL BLOCK	5, 6	17,28	129	Echo of request qualifier codes
12	3	PATTERN MASK	5, 6	00, 01	129	Echo of request qualifier codes
20	0	BINARY COUNTER - ALL VARIATIONS	1, 7, 8, 9, 10, 22	00, 01, 06	Not Used	Not Used
20	1	32-BIT BINARY COUNTER	1, 7, 8, 9, 10	00, 01, 06	129	01
20	2	16-BIT BINARY COUNTER	1, 7, 8, 9, 10	00, 01, 06	129	01
20	3	32-BIT DELTA COUNTER	Not Used	Not Used	Not Used	Not Used
20	4	16-BIT DELTA COUNTER	Not Used	Not Used	Not Used	Not Used
20	5	32-BIT BINARY COUNTER WITHOUT FLAG	1, 7, 8, 9, 10	00, 01, 06	129	01
20	6	16-BIT BINARY COUNTER WITHOUT FLAG	1, 7, 8, 9, 10	00, 01, 06	129	01

Obj.	Var.	Description	Request Function Code	Request Qualifier Codes (Hexadecimal)	Response Function Code	Response Qualifier Codes (Hexadecimal)
20	7	32-BIT DELTA COUNTER WITHOUT FLAG	Not Used	Not Used	Not Used	Not Used
20	8	16-BIT DELTA COUNTER WITHOUT FLAG	Not Used	Not Used	Not Used	Not Used
21	0	FROZEN COUNTER - ALL VARIATIONS	1, 22	00, 01, 06	Not Used	Not Used
21	1	32-BIT FROZEN COUNTER	1	00, 01, 06	129	01
21	2	16-BIT FROZEN COUNTER	1	00, 01, 06	129	01
21	3	32-BIT FROZEN DELTA COUNTER	Not Used	Not Used	Not Used	Not Used
21	4	16-BIT FROZEN DELTA COUNTER	Not Used	Not Used	Not Used	Not Used
21	5	32-BIT FROZEN COUNTER WITH TIME OF FREEZE	1	00, 01, 06	129	01
21	6	16-BIT FROZEN COUNTER WITH TIME OF FREEZE	1	00, 01, 06	129	01
21	7	32-BIT FROZEN DELTA COUNTER WITH TIME OF FREEZE	Not Used	Not Used	Not Used	Not Used
21	8	16-BIT FROZEN DELTA COUNTER WITH TIME OF FREEZE	Not Used	Not Used	Not Used	Not Used
21	9	32-BIT FROZEN COUNTER WITHOUT FLAG	1	00, 01, 06	129	01
21	10	16-BIT FROZEN COUNTER WITHOUT FLAG	1	00, 01, 06	129	01
21	11	32-BIT FROZEN DELTA COUNTER WITHOUT FLAG	1	00, 01, 06	Not Used	Not Used
21	12	16-BIT FROZEN DELTA COUNTER WITHOUT FLAG	1	00, 01, 06	Not Used	Not Used
22	0	COUNTER CHANGE EVENT - ALL VARIATIONS	1	06, 07, 08	Not Used	Not Used
22	1	32-BIT COUNTER CHANGE EVENT WITHOUT TIME	1	06, 07, 08	129, 130	28
22	2	16-BIT COUNTER CHANGE EVENT WITHOUT TIME	1	06, 07, 08	129, 130	28
22	3	32-BIT DELTA COUNTER CHANGE EVENT WITHOUT TIME	Not Used	Not Used	Not Used	Not Used
22	4	16-BIT DELTA COUNTER CHANGE EVENT WITHOUT TIME	Not Used	Not Used	Not Used	Not Used
22	5	32-BIT COUNTER CHANGE EVENT WITH TIME	1	06, 07, 08	129, 130	28

Obj.	Var.	Description	Request Function Code	Request Qualifier Codes (Hexadecimal)	Response Function Code	Response Qualifier Codes (Hexadecimal)
22	6	16-BIT COUNTER CHANGE EVENT WITH TIME	1	06, 07, 08	129, 130	28
22	7	32-BIT DELTA COUNTER CHANGE EVENT WITH TIME	Not Used	Not Used	Not Used	Not Used
22	8	16-BIT DELTA COUNTER CHANGE EVENT WITH TIME	Not Used	Not Used	Not Used	Not Used
23	0	FROZEN COUNTER - ALL VARIATIONS	1	06, 07, 08	Not Used	Not Used
23	1	32-BIT FROZEN COUNTER EVENT WITHOUT TIME	1	06, 07, 08	129, 130	28
23	2	16-BIT FROZEN COUNTER EVENT WITHOUT TIME	1	06, 07, 08	129, 130	28
23	3	32-BIT FROZEN DELTA COUNTER EVENT WITHOUT TIME	Not Used	Not Used	Not Used	Not Used
23	4	16-BIT FROZEN DELTA COUNTER EVENT WITHOUT TIME	Not Used	Not Used	Not Used	Not Used
23	5	32-BIT FROZEN COUNTER EVENT WITH TIME	1	06, 07, 08	129, 130	28
23	6	16-BIT FROZEN COUNTER EVENT WITH TIME	1	06, 07, 08	129, 130	28
23	7	32-BIT FROZEN DELTA COUNTER EVENT WITH TIME	Not Used	Not Used	Not Used	Not Used
23	8	16-BIT FROZEN DELTA COUNTER EVENT WITH TIME	Not Used	Not Used	Not Used	Not Used
30	0	ANALOG INPUT – ALL VARIATIONS	1, 22	00, 01, 06	Not Used	Not Used
30	1	32-BIT ANALOG INPUT	1	00, 01, 06	129	01
30	2	16-BIT ANALOG INPUT	1	00, 01, 06	129	01
30	3	32-BIT ANALOG INPUT WITHOUT FLAG	1	00, 01, 06	129	01
30	4	16-BIT ANALOG INPUT WITHOUT FLAG	1	00, 01, 06	129	01
30	5	32-BIT FLOATING POINT ANALOG INPUT	1	00, 01, 06	129	01
31	0	FROZEN ANALOG INPUT - ALL VARIATIONS	Not Used	Not Used	Not Used	Not Used
31	1	32-BIT FROZEN ANALOG INPUT	Not Used	Not Used	Not Used	Not Used
31	2	16-BIT FROZEN ANALOG INPUT	Not Used	Not Used	Not Used	Not Used
31	3	32-BIT FROZEN ANALOG INPUT WITH TIME OF FREEZE	Not Used	Not Used	Not Used	Not Used

Obj.	Var.	Description	Request Function Code	Request Qualifier Codes (Hexadecimal)	Response Function Code	Response Qualifier Codes (Hexadecimal)
31	4	16-BIT FROZEN ANALOG INPUT WITH TIME OF FREEZE	Not Used	Not Used	Not Used	Not Used
31	5	32-BIT FROZEN ANALOG INPUT WITHOUT FLAG	Not Used	Not Used	Not Used	Not Used
31	6	16-BIT FROZEN ANALOG INPUT WITHOUT FLAG	Not Used	Not Used	Not Used	Not Used
32	0	ANALOG CHANGE EVENT - ALL VARIATIONS	1	06, 07, 08	Not Used	Not Used
32	1	32-BIT ANALOG CHANGE EVENT WITHOUT TIME	1	06, 07, 08	129, 130	28
32	2	16-BIT ANALOG CHANGE EVENT WITHOUT TIME	1	06, 07, 08	129, 130	28
32	3	32-BIT ANALOG CHANGE EVENT WITH TIME	1	06, 07, 08	129, 130	28
32	4	16-BIT ANALOG CHANGE EVENT WITH TIME	1	06, 07, 08	129, 130	28
32	5	32-BIT FLOATING POINT ANALOG CHANGE EVENT WITHOUT TIME	1	06, 07, 08	129, 130	28
32	7	32-BIT FLOATING POINT ANALOG CHANGE EVENT WITH TIME	1	06, 07, 08	129, 130	28
33	0	FROZEN ANALOG EVENT - ALL VARIATIONS	Not Used	Not Used	Not Used	Not Used
33	1	32-BIT FROZEN ANALOG EVENT WITHOUT TIME	Not Used	Not Used	Not Used	Not Used
33	2	16-BIT FROZEN ANALOG EVENT WITHOUT TIME	Not Used	Not Used	Not Used	Not Used
33	3	32-BIT FROZEN ANALOG EVENT WITH TIME	Not Used	Not Used	Not Used	Not Used
33	4	16-BIT FROZEN ANALOG EVENT WITH TIME	Not Used	Not Used	Not Used	Not Used
40	0	ANALOG OUTPUT STATUS - ALL VARIATIONS	1	00, 01, 06	Not Used	Not Used
40	1	32-BIT ANALOG OUTPUT STATUS	1	00, 01, 06	129	01
40	2	16-BIT ANALOG OUTPUT STATUS	1	00, 01, 06	129	01
41	0	ANALOG OUTPUT BLOCK - ALL VARIATIONS	Not Used	Not Used	Not Used	Not Used
41	1	32-BIT ANALOG OUTPUT BLOCK	3, 4, 5, 6	17, 28	129	Echo of request qualifier codes
41	2	16-BIT ANALOG OUTPUT BLOCK	3, 4, 5, 6	17, 28	129	Echo of request qualifier codes

Obj.	Var.	Description	Request Function Code	Request Qualifier Codes (Hexadecimal)	Response Function Code	Response Qualifier Codes (Hexadecimal)
50	0	TIME AND DATE - ALL VARIATIONS	Not Used	Not Used	Not Used	Not Used
50	1	TIME AND DATE	1, 2	07, where quantity = 1	129	07, Quantity = 1
50	2	TIME AND DATE WITH INTERVAL	Not Used	Not Used	Not Used	Not Used
51	0	TIME AND DATE CTO - ALL VARIATIONS	Not Used	Not Used	Not Used	Not Used
51	1	TIME AND DATE CTO	Not Used	Not Used	129, 130	07, Quantity = 1
51	2	UN-SYNCHRONIZED TIME AND DATE CTO	Not Used	Not Used	129, 130	07, Quantity = 1
52	0	TIME DELAY – ALL VARIATIONS	Not Used	Not Used	Not Used	Not Used
52	1	TIME DELAY COARSE	Not Used	Not Used	Not Used	Not Used
52	2	TIME DELAY FINE	Not Used	Not Used	129	07, Quantity = 1
60	0	CLASS DATA – ALL VARIATIONS	Not Used	Not Used	Not Used	Not Used
60	1	CLASS 0 DATA	1	06	Not Used	1
60	2	CLASS 1 DATA	1	06, 07, 08	Not Used	Not Used
			20, 21, 22	06		
60	3	CLASS 2 DATA	1	06, 07, 08	Not Used	Not Used
			20, 21, 22	06		
60	4	CLASS 3 DATA	1	06, 07, 08	Not Used	Not Used
			20, 21, 22	06		
70	1	FILE IDENTIFIER	Not Used	Not Used	Not Used	Not Used
80	1	INTERNAL INDICATIONS	1	00, 01	129, 130	00
			2	00		
81	0	STORAGE OBJECT - ALL VARIATIONS	Not Used	Not Used	Not Used	Not Used
81	1	STORAGE OBJECT	Not Used	Not Used	Not Used	Not Used
82	1	DEVICE PROFILE	Not Used	Not Used	Not Used	Not Used
83	1	PRIVATE REGISTRATION OBJECT	Not Used	Not Used	Not Used	Not Used
83	2	PRIVATE REGISTRATION OBJECT DESCRIPTOR	Not Used	Not Used	Not Used	Not Used
90	1	APPLICATION IDENTIFIER	Not Used	Not Used	Not Used	Not Used
100	1	SHORT FLOATING POINT	Not Used	Not Used	Not Used	Not Used
100	2	LONG FLOATING POINT	Not Used	Not Used	Not Used	Not Used
100	3	EXTENDED FLOATING POINT	Not Used	Not Used	Not Used	Not Used

Obj.	Var.	Description	Request Function Code	Request Qualifier Codes (Hexadecimal)	Response Function Code	Response Qualifier Codes (Hexadecimal)
101	1	SMALL-PACKED BINARY CODED DECIMAL	Not Used	Not Used	Not Used	Not Used
101	2	MEDIUM-PACKED BINARY CODED DECIMAL	Not Used	Not Used	Not Used	Not Used
101	3	LARGE-PACKED BINARY CODED DECIMAL	Not Used	Not Used	Not Used	Not Used

MODIFICATION RECORD

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