

DNP3 Device Profile Document – Master

<h3>DNP3</h3> <h4>DEVICE PROFILE DOCUMENT</h4>	
Vendor Name: Control Microsystems Inc.	
Device Name: DNP3 Master Driver (ClearSCADA 2009)	
<p>Highest DNP Level Supported:</p> <p>For Requests Level 3</p> <p>For Responses Level 3</p>	<p>Device Function:</p> <p>Master <input checked="" type="checkbox"/> Slave <input type="checkbox"/></p>
<p>Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):</p> <ul style="list-style-type: none"> <u>Obj Group 0, Var ALL</u> (Device Attributes) <u>Obj Group 10, Var 1</u> (BO Packed Format) <u>Obj Group 11, Var 1</u> (BO Status without time) <u>Obj Group 11, Var 2</u> (BO Status with time) <u>Obj Group 13, Var 1</u> (BO Command status without time) <u>Obj Group 13, Var 2</u> (BO Command status with time) <u>Obj Group 22, Var 5</u> (32-bit Counter Chg Evt with Time) <u>Obj Group 22, Var 6</u> (16-bit Counter Chg Evt with Time) <u>Obj Group 30, Var 5</u> (Single Precision Floating Pt. Ana Input) <u>Obj Group 30, Var 6</u> (Double-precision, floating point with flag Analog Input) <u>Obj Group 32, Var 3</u> (32-bit Ana Chg Evt with Time) <u>Obj Group 32, Var 4</u> (16-bit Ana Chg Evt with Time) <u>Obj Group 32, Var 5</u> (Single Precision Floating Pt. Ana Chg Evt without Time) <u>Obj Group 32, Var 6</u> (Double-precision, floating point Analog Input Chg Evt without Time) <u>Obj Group 32, Var 7</u> (Single Precision Floating Pt. Ana Chg Evt) <u>Obj Group 32, Var 8</u> (Double-precision, floating point Analog Input Chg Evt) <u>Obj Group 40, Var 1</u> (32-bit Ana Output status) <u>Obj Group 40, Var 3</u> (Single Precision Floating Pt. Ana Output status) <u>Obj Group 40, Var 4</u> (Double-precision, floating point Analog Output status) <u>Obj Group 41, Var 1</u> (32-bit Ana Output Block) <u>Obj Group 41, Var 3</u> (Single Precision Floating Pt. Ana Output Block) <u>Obj Group 41, Var 4</u> (Double-precision, floating point Analog Output Block) <u>Obj Group 42, Var 1</u> (AO Event 32-bit without time) <u>Obj Group 42, Var 2</u> (AO Event 16-bit without time) <u>Obj Group 42, Var 3</u> (AO Event 32-bit with time) <u>Obj Group 42, Var 4</u> (AO Event 16-bit with time) <u>Obj Group 42, Var 5</u> (AO Event single-precision floating-point without time) <u>Obj Group 42, Var 6</u> (AO Event double-precision floating-point without time) <u>Obj Group 42, Var 7</u> (AO Event single-precision floating-point with time) <u>Obj Group 42, Var 8</u> (AO Event double-precision floating-point with time) <u>Obj Group 43, Var 1</u> (AO Command Event 32-bit without time) <u>Obj Group 43, Var 2</u> (AO Command Event 16-bit without time) <u>Obj Group 43, Var 3</u> (AO Command Event 32-bit with time) <u>Obj Group 43, Var 4</u> (AO Command Event 16-bit with time) <u>Obj Group 43, Var 5</u> (AO Command Event single-precision floating-point without time) <u>Obj Group 43, Var 6</u> (AO Command Event double-precision floating-point without time) <u>Obj Group 43, Var 7</u> (AO Command Event single-precision floating-point with time) <u>Obj Group 42, Var 8</u> (AO Command Event double-precision floating-point with time) <u>Obj Group 50, Var 1</u> (Time and Date read and write) <u>Obj Group 70, Var 1</u> (File Identifier) <u>Obj Group 70, Var 2</u> (File Authentication) 	

CONTROL MICROSYSTEMS

Obj Group 70, Var 3	(File command)	Obj 110	(Octet String)
Obj Group 70, Var 4	(File command status)	Obj 111	(Octet String Event)
Obj Group 70, Var 5	(File Transport)	Obj 112	(Virtual Terminal Block)
Obj Group 70, Var 6	(File Transport status)	Obj 113	(Virtual Terminal Event)
Func Code 14	(Warm Restart)		
Func Code 15	(Initialize Data)		
Maximum Data Link Frame Size (octets):		Maximum Application Fragment Size (octets):	
Transmitted	<u>292</u> see Note*1	Transmitted	<u>2048</u> see Note*1 (if >2048, must be configurable)
Received	(must be 292)	Received	<u>2048</u> (must be > 249)
Maximum Data Link Re-tries:		Maximum Application Layer Re-tries:	
<input type="checkbox"/> None <input type="checkbox"/> Fixed at <input checked="" type="checkbox"/> Configurable, range 0 to 255		<input type="checkbox"/> None <input checked="" type="checkbox"/> Configurable, range 0 to 255 (Fixed is not permitted) see Note*2	

CONTROL MICROSYSTEMS

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>by settings; see Note*3</u>	
Requires Application Layer Confirmation:				
<input checked="" type="checkbox"/> Never				
<input type="checkbox"/> Always (not recommended)				
<input type="checkbox"/> When reporting Event Data (Slave devices only)				
<input type="checkbox"/> When sending multi-fragment responses (Slave devices only)				
<input type="checkbox"/> Sometimes	If 'Sometimes', when?			
<input type="checkbox"/> Configurable	If 'Configurable', how?			
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 checked="" type="checkbox"/> None	<input type="checkbox"/> Fixed at _____	<input type="checkbox"/> Variable	<input type="checkbox"/> Configurable
Others	_____			
Attach explanation if 'Variable' or 'Configurable' was checked for any timeout see Note*4				
Sends Control Operations:				
WRITE Binary Outputs	<input checked="" type="checkbox"/> Never	<input type="checkbox"/> Always	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Configurable
SELECT/OPERATE	<input type="checkbox"/> Never	<input type="checkbox"/> Always	<input type="checkbox"/> Sometimes	<input checked="" type="checkbox"/> Configurable
DIRECT OPERATE	<input type="checkbox"/> Never	<input type="checkbox"/> Always	<input type="checkbox"/> Sometimes	<input checked="" type="checkbox"/> Configurable
DIRECT OPERATE - NO ACK	<input type="checkbox"/> Never	<input type="checkbox"/> Always	<input type="checkbox"/> Sometimes	<input checked="" type="checkbox"/> Configurable
Count > 1	<input type="checkbox"/> Never	<input type="checkbox"/> Always	<input type="checkbox"/> Sometimes	<input checked="" type="checkbox"/> Configurable
Pulse On	<input type="checkbox"/> Never	<input type="checkbox"/> Always	<input type="checkbox"/> Sometimes	<input checked="" type="checkbox"/> Configurable
Pulse Off	<input type="checkbox"/> Never	<input type="checkbox"/> Always	<input type="checkbox"/> Sometimes	<input checked="" type="checkbox"/> Configurable
Latch On	<input type="checkbox"/> Never	<input type="checkbox"/> Always	<input type="checkbox"/> Sometimes	<input checked="" type="checkbox"/> Configurable
Latch Off	<input type="checkbox"/> Never	<input type="checkbox"/> Always	<input type="checkbox"/> Sometimes	<input checked="" 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. see Note*5				
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)				

CONTROL MICROSYSTEMS

FILL OUT THE FOLLOWING ITEMS FOR SLAVE DEVICES ONLY:	
<p>Reports Binary Input Change Events when no specific variation requested: (Class Poll or Obj 2 Var 0 read)</p> <p> <input type="checkbox"/> Never <input type="checkbox"/> Only time-tagged <input type="checkbox"/> Only non-time-tagged <input type="checkbox"/> Configurable to send both, one or the other (attach explanation) </p>	<p>Reports time-tagged Binary Input Change Events when no specific variation requested: (Class Poll or Obj 2 Var 0 read)</p> <p> <input type="checkbox"/> Never <input type="checkbox"/> Binary Input Change With Time <input type="checkbox"/> Binary Input Change With Relative Time <input type="checkbox"/> Configurable (attach explanation) </p>
<p>Sends Unsolicited Responses:</p> <p> <input type="checkbox"/> Never <input type="checkbox"/> Configurable (attach explanation) <input type="checkbox"/> Only certain objects <input type="checkbox"/> Sometimes (attach explanation) </p> <p> <input type="checkbox"/> ENABLE/DISABLE UNSOLICITED Function codes supported </p>	<p>Sends Static Data in Unsolicited Responses:</p> <p> <input type="checkbox"/> Never <input type="checkbox"/> When Device Restarts <input type="checkbox"/> When Status Flags Change </p> <p>No other options are permitted.</p>
<p>Default Counter Object/Variation:</p> <p> <input type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (attach explanation) <input type="checkbox"/> Default Object <input type="checkbox"/> Default Variation <input type="checkbox"/> Point-by-point list attached </p>	<p>Counters Roll Over at:</p> <p> <input type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (attach explanation) <input type="checkbox"/> 16 Bits <input type="checkbox"/> 32 Bits <input type="checkbox"/> Other Value <input type="checkbox"/> Point-by-point list attached </p>
<p>Sends Multi-Fragment Responses: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	

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Note*1

Transmitted Data Link Layer frame size and Application Layer fragment size are adjustable in the ClearSCADA server configuration.

Note*2

Application retries are applicable to ClearSCADA requests to an Outstation where a matching response is not received to a request after the *Complete Application Fragment Timeout*.

Note*3

Data Link Layer Confirmation is configurable for the following cases for each DNP3 outstation record:

NEVER - never sends data link layer confirm
 SOMETIMES - sends data link layer confirm for multi-frame fragments
 ALWAYS- always sends data link layer confirm

The *DLL Confirm* mode can be set via outstation configuration form.

Note*4

Configurable timeouts can be set via configuration forms. Values units are indicated for each parameter (eg. mS, S, Min) or in OPC Time Format where no units given. *Data link confirm timeouts* are individually configurable for each DNP3 outstation. *Complete application fragment timeout* and *application timeout* may be varied for each outstation via configuration form.

Note*5

ClearSCADA provides DNP3 Pulse Point types for Trip/Close and NULL pulse point types. DNP3 Binary Output points use Latch/Unlatch controls. All control point types can be selected for *Direct Operate*, *Select Before Operate*, or *Direct Operate No Acknowledge*.

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IMPLEMENTATION OBJECT

This table describes the objects, function codes and qualifiers used in the device:

OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)	
Obj	Var	Description	Func Codes (dec)	Qual Codes (hex)	Func Codes	Qual Codes (hex)
0	254	Device Attributes – Non-specific all attributes request	1	00,01		
0	ALL	Device Attributes			129	00,01
1	0	Binary Input – All Variations	1	00,01		
1	1	Binary Input			129	00,01,17,28
1	2	Binary Input Status			129	00,01,17,28
2	0	Binary Input Change Event- All Var	1	06		
2	1	Binary Input Change without time			129,130	00,01,17,28
2	2	Binary Input Change with time			129,130	00,01,17,28
2	3	Binary Input Chg with relative time			129,130	00,01,17,28
10	0	Binary Output - All Variations	1	00,01		
10	1	Binary Output			129, 130	00,01,17,28
10	2	Binary Output Status			129,130	00,01,17,28
11	0	Binary Output Events – All Variations				
11	1	Binary Output Event – Status without time			129, 130	00,01,17,28
11	2	Binary Output Event – Status with time			129, 130	00,01,17,28
12	1	Control Relay Output Block	3,4,5,6	17,28	129	echo of req
13	0	Binary Output Command Event				
13	1	Binary Output Command Event – Command status without time			129, 130	00,01,17,28
13	2	Binary Output Command Event – Command status with time			129, 130	00,01,17,28
20	0	Binary Counter - All Variations	1 7,8,9,10	00,01		

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Obj	Var	Description	Func Codes (dec)	Qual Codes (hex)	Func Codes	Qual Codes (hex)
20	1	32-bit Binary Counter			129,130	00,01,17,28
20	2	16-bit Binary Counter			129,130	00,01,17,28
20	5	32-bit Binary Counter without flag	2	00,01	129,130	00,01,17,28
20	6	16-bit Binary Counter without flag	2	00,01	129,130	00,01,17,28
21	1	32-bit Frozen Counter			129,130	00,01,17,28
21	2	16-bit Frozen Counter			129,130	00,01,17,28
21	9	32-bit Frozen Counter without flag			129,130	00,01,17,28
21	10	16-bit Frozen Counter without flag			129,130	00,01,17,28
22	0	Counter Change Event –All Var	1	06		
22	1	32-bit Counter change evnt no time			129,130	00,01,17,28
22	2	16-bit Counter change evnt no time			129,130	00,01,17,28
22	5	32-bit Counter change evnt with time			129,130	00,01,17,28
22	6	16-bit Counter change evnt with time			129,130	00,01,17,28
30	0	Analog Input - All Variations	1	00,01		
30	1	32-bit Analog Input			129	00,01,17,28
30	2	16-bit Analog Input			129	00,01,17,28
30	3	32-bit Analog Input without flag			129	00,01,17,28
30	4	16-bit Analog Input without flag			129	00,01,17,28
30	5	Single Precision Floating Point Analog Input			129	00,01,17,28
30	6	Double Precision Floating Point Analog Input			129	00,01,17,28
32	0	Analog Change Event - All Var	1	06		

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OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)	
Obj	Var	Description	Func Codes (dec)	Qual Codes (hex)	Func Codes	Qual Codes (hex)
32	1	32-bit Analog Chg Evnt without Time			129,130	00,01,17,28
32	2	16-bit Analog Chg Evnt without Time			129,130	00,01,17,28
32	3	32-bit Analog Chg Event with Time			129,130	00,01,17,28
32	4	16-bit Analog Chg Event with Time			129,130	00,01,17,28
32	5	Short Floating Point Ana Chg Evnt			129,130	00,01,17,28
32	6	Double Precision Floating Point Analog Input Chg Evnt			129,130	00,01,17,28
32	7	Short Float Pnt Ana Chg Evt w/Time			129,130	00,01,17,28
32	8	Double Precision Floating Point Analog Input Chg Evnt w/Time			129,130	00,01,17,28
40	0	Analog Output Status - All Variations	1	00,01		
40	1	32-bit Analog Output Status			129	00,01,17,28
40	2	16-bit Analog Output Status			129	00,01,17,28
40	3	Short Floating Pnt Ana Outp Status			129	00,01,17,28
40	4	Double Precision Floating Pnt Ana Outp Status			129	00,01,17,28
41	1	32-bit Analog Output Block	3,4,5,6	17,28	129	echo of req
41	2	16-bit Analog Output Block	3,4,5,6	17,28	129	echo of req
41	3	Short Floating Pnt Ana Output Block	3,4,5,6	17,28	129	echo of req
41	4	Double Precision Floating Pnt Ana Outp Block	3,4,5,6	17,28	129	echo of req
42	1	32-bit Analog Output Chg Evnt without Time			129,130	00,01,17,28
42	2	16-bit Analog Output Chg Evnt without Time			129,130	00,01,17,28
42	3	32-bit Analog Output Chg Event with Time			129,130	00,01,17,28
42	4	16-bit Analog Output Chg Event with Time			129,130	00,01,17,28

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OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)	
Obj	Var	Description	Func Codes (dec)	Qual Codes (hex)	Func Codes	Qual Codes (hex)
42	5	Short Floating Point Ana Output Chg Evnt			129,130	00,01,17,28
42	6	Double Precision Floating Point Analog Output Chg Evnt			129,130	00,01,17,28
42	7	Short Float Pnt Ana Output Chg Evt w/Time			129,130	00,01,17,28
42	8	Double Precision Floating Point Analog Output Chg Evnt w/Time			129,130	00,01,17,28
43	1	32-bit Analog Output Command Evnt without Time			129,130	00,01,17,28
43	2	16-bit Analog Output Command Evnt without Time			129,130	00,01,17,28
43	3	32-bit Analog Output Command Event with Time			129,130	00,01,17,28
43	4	16-bit Analog Output Command Event with Time			129,130	00,01,17,28
43	5	Short Floating Point Ana Output Command Evnt			129,130	00,01,17,28
43	6	Double Precision Floating Point Analog Output Command Evnt			129,130	00,01,17,28
43	7	Short Float Pnt Ana Output Command Evt w/Time			129,130	00,01,17,28
43	8	Double Precision Floating Point Analog Outp Command Evnt w/Time			129,130	00,01,17,28
50	1	Time and Date	2	07 (qty=1)	129	07 (qty=1)
50	3	Time and Date at last recorded time	1, 2	07 (qty=1)	129	07 (qty=1)
51	1	Time and Date CTO			129,130	07 (qty=1)
51	2	Unsynchrosed Time and date CTO			129,130	07 (qty=1)
52	1	Time Delay Course			129	07 (qty=1)
52	2	Time Delay Fine			129	07 (qty=1)
60	1	Class 0 Data	1	06		
60	2	Class 1 Data	1,20,21	06		
60	3	Class 2 Data	1,20,21	06		
60	4	Class 3 Data	1,20,21	06		
70	1	File Identifier	2	1B	129	1B, 5B
70	2	Authentication	31	5B	129	5B

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OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)	
Obj	Var	Description	Func Codes (dec)	Qual Codes (hex)	Func Codes	Qual Codes (hex)
70	3	File Command	25, 27	5B		
70	4	File Command Status	26, 30	5B	129, 130	5B
70	5	File Transport	1, 2	5B	129, 130	5B
70	6	File Transport Status	1, 2	5B	129, 130	5B
80	1	Internal Indications	2	00 (index=7)	129	00
110	Length	String Octet	1,2	0x06, 0x17, 0x28	129	00,01,17, 28
111	Length	String Octet Event			129, 130	00,01,17, 28
112	Length	Virtual Terminal Output Block	2	0x17, 0x28		
113	Length	Virtual Terminal Event Data			129,130	17,28
No	Object	Cold Restart	13		129 (obj 52 var 2)	07 (qty=1)
No	Object	Warm Restart	14		129 (obj 52 var 2)	07 (qty=1)
No	Object	Delay Measurement	23		129 (obj 52 var 2)	07 (qty=1)
No	Object	Record Current Time	24		129	

(obj group nn var nn) indicates object group/variation returned