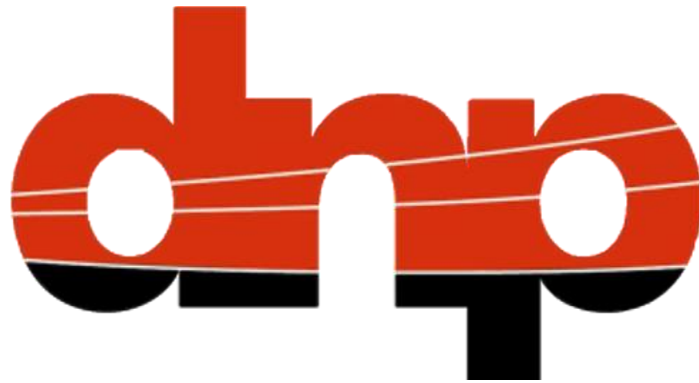


DNP3 Intelligent Electronic Device (IED) Certification Procedure

Subset Levels 1, 2, and 3



Version 3.1 rev 1

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DNP Users Group on March 27, 2022

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Revision history

Date	Version	Sections affected	Reason for change
18-Jan-1999	1.00	ALL	Initial release
15-Dev-1999	1.01	see errata sheet for 1.00	Fixes inconsistencies and errors Designates protocol as DNP3-1999 (formerly DNP V3.00 with extensions)
10-July-2000	2.00	8.11.1.1 8.11.2.5.9 8.6.5.1 8.6.5.4 8.2.1.1 8.2.1.2.11 – 15 8.4.1.1 8.4.1.2.8 – 12 6 6.6.2.5	Added required parameter – maximum number of unsolicited retries Added test procedure from TB9912-002 Added desired response to addresses 0xFFFE and 0xFFFD Added test procedure from TB9912-003 Added requirements for Control SBO retries Added test procedures from TB2000-002 Added requirements for analog Output SBO retries Added test procedures from TB2000-002 Removed reference to function code 1 Removed function code 0xD1 from table
5-July-2001	2.1	8.2.1.2.10, step 1 8.4.1.2.7, step 1 8.6.5.4	Replace “end testing of binary Output, SBO” with “skip this section” Replace “end testing of analog Output, SBO” with “skip this section” Added step 2 – “Issue a link reset using link control block 0xC0”

Rev 2.1 Continued over...

Date	Version	Sections affected	Reason for change
		<p>8.2.5</p> <p>8.2.1.1, 8.2.1.2.3, 8.2.2.1, 8.2.2.2.2, 8.4.1.1, 8.4.1.2.3, 8.4.2.1, 8.4.2.2.2</p> <p>8.2.4.1 – 8.2.4.2, 8.4.4.1 – 8.4.4.2</p> <p>Section 9, Appendices A and B</p>	<p>Added test procedure from TB2000-006</p> <p>Added status code in error response as required in TB2001-01</p> <p>Added test procedures from TB2001-001</p> <p>Removed; the information required for these sections is not available and may not be for some time.</p>
21-July-2002	2.2	<p>8.5.1, Table 8-3</p> <p>8.6.5.4, step 5</p> <p>8.6.6.2.1-8.6.6.2.3, steps 9 and 12</p> <p>8.14.2.10-8.14.2.11, step 4</p> <p>8.14.2.13-8.14.2.14, step 4</p> <p>8.14.2.15, steps 4 and 6</p> <p>8.16.2.2.5, step 9</p>	<p>Added frozen counter objects</p> <p>Added at the end “using link control block 0xF3”.</p> <p>Added new steps to confirm the changes</p> <p>Added “with time” after “binary input change”</p> <p>Added “with relative time” after “binary input change”</p> <p>Added “with relative time” after “binary input change”</p> <p>Replaced “Issue a freeze counter command” with “Issue a freeze and clear”; replaced function code 0x08 with 0x0A</p>
8-Sept-2003	2.3	<p>8.2.1.2.13, step 8</p> <p>8.14.2.9, step 2 (plus others in same section)</p> <p>8.14 (several subsections)</p>	<p>Added at the end “with a status code value of 2 (NO MATCHING SELECT)”.</p> <p>Added “If the response is not Null, ...”</p> <p>Corrected various numbering and consistency issues</p>

Rev 2.3 Continued over...

Date	Version	Sections affected	Reason for change
		8.16.1.2, Tables 8-3, 8-4	Removed references to delta counter objects
		8.16.1.2.2 and 8.16.2.2.2	Added text to exclude flag verification for non-flag variations
		6.6.3.2, step 3	Changed e.g. 0x03 to e.g. 0x83
		8.15	Added text to skip time sync and delay measurement steps if IIN1.4 not set by the DUT
		8.4.1.2.1, step 2	Changed “...end testing of analog Outputs” to “...end testing of analog Output SBO”
		8.4.3.2.1, step 3	Changed “...does support...” to “...does not support...”
		8.5.5.2.2, step 9	Changed “...in table 8-4...” to “...in tables 8-3 and 8-4...”
		8.19.2.1, step 14	Changed “step 11” to “step 12”
		8.9.2.2, steps 14 and 15	Changed text to handle case where only two fragments are expected.
		8.11.2.6, step 7	Changed “variations 3,2,1,0” to “variations 2,3, and 4”
		8.12.2, step 1	Changed 0xF4 to 0xC4
		8.6.4	Updated to test Local Forced Data flag as well as IIN1.5
9-Nov-2004	2.4	8.2.1.2.13, step 8	Remove text added in version 2.3 (see TB2004-002)
		6.7	Added test procedure from TB2003-003 (Self address)
		Table 3-1, 8-3, 8-4, 8.13, 8.14	Added new double-bit input objects/tests from TB2004-003

Revision history continued over...

Date	Version	Sections affected	Reason for change
2-Oct-2005	2.5	6.4.2 step 20	Added text to clarify the response in step 18 for a REQUEST LINK STATUS frame
		6.4.2, 6.5.2	Removed references to RESET USER PROCESS frames
26-Mar-2009	2.6	1	Added sentence about referring disagreements to the TC
		1.1	Updated to reference the latest documentation set
		2	Added note 14 that Range fields utilizing start and stop indices must specify stop index >= start index.
		5.1	Added requirement for an XML Device Profile.
		6.2	Deprecated the Test Link service.
		8.12.2	Corrected steps 6 and 7.
		8.23	Added new section to test Device Attributes
		9	Added note that Test Link is deprecated.
		Various	Corrected all appearances of Null Response for consistency.
		8.21	Added note that Devices must be configurable not to report double-bit inputs.
		8.13.1, 8.13.2.1, 8.14.1, 8.14.2.1, 8.15.2, 8.16.1.2.1, 8.17.2.1, 8.18.2.1, 8.19.1, 8.19.2.1	Added clarification about which requests are relevant to Null Responses, which options the DUT supports, and which sections can be skipped.

Revision history continued over...

Date	Version	Sections affected	Reason for change
28-Oct-2010	2.6 rev1	5.1 8.23	XML Device Profile is optional, not mandatory. object group 0 (Device Attributes) is optional, not mandatory.
2-Mar-2016	2.7	8.14.2.9, step 6 8.14.2.12, step 6	Changed tests as per the results of VOTE2016-01: If the device does not support the requested binary input events, verify that it replies with a Null Error Response with IIN2.1 set.
20-Mar-2020	2.8	Throughout the document 8.6.4.2 and 8.6.4.3 8.5.2.1, 8.5.2.2, 8.5.3.1, 8.5.3.2, 8.5.4.1, 8.5.4.2	Changes some of the formatting in the document due to a template change and upgrading/recovering the source document. Some tests are rephrased to allow for a single test procedure for subset levels 1 and 2. Some minor clarifications are added. “Slave” was replaced with “outstation” throughout. Integrate changes for TB2017-001. Integrate changes for TB2018-001.
9-Dec-2020	3.0	Throughout	Add subset level 3 test procedures.
19-Apr-2022	3.1	Section 9 Section 10	Added tests for network communication Added tests for output events
13-Sep-2022	3.1 rev 1	Title Page Trademark Notice 3.2 Throughout	Added notice of UG vote approving release Updated copyright dates Updated references to earlier DNP3 specifications to refer to IEEE 1815 Added Copyright notice to page footer; corrected references to Section 2, Note #6; formatting and spelling corrections

Contents

1	Overview	1
1.1	Protocol specification	1
1.2	Subset levels.....	1
2	Notes.....	4
3	Definitions.....	5
3.1	General.....	5
3.2	Internal Indications	5
3.3	Error Responses	6
3.4	Changes or Events.....	6
3.4.1	Rules.....	7
4	References	8
5	Pretest Review	9
5.1	Device Profile Review.....	9
5.2	Equipment Review	10
6	Link Layer	11
6.1	Reset Link and Passive Confirm support.....	11
6.1.1	Desired Behavior	11
6.1.2	Test Procedure	11
6.2	Test Link	12
6.3	Request Link Status.....	12
6.3.1	Desired Behavior	12
6.3.2	Test Procedure	12
6.4	Test Retries	12
6.4.1	Desired Behavior	12
6.4.2	Test Procedure	13
6.5	DIR and FCV Bits.....	13
6.5.1	Desired Behavior	13
6.5.2	Test Procedure	14
6.6	Data Link Rejects Invalid Frames.....	14
6.6.1	Desired Behavior	14
6.6.2	Test Procedure – Primary Frames.....	15

6.6.3	Test Procedure – Secondary Frames.....	17
6.7	Self-Address Support	18
6.7.1	Desired Behavior	18
6.7.2	Test Procedure	18
7	Transport Layer	19
7.1	Desired Behavior	19
7.2	Test Procedure	19
8	Application Layer	20
8.1	Binary Output Status.....	20
8.1.1	Desired Behavior	20
8.1.2	Test Procedure	20
8.2	Binary Outputs	20
8.2.1	Select Before Operate.....	21
8.2.2	Direct Operate with Acknowledge.....	25
8.2.3	Direct Operate, No Acknowledge	26
8.2.4	Multiple Object Requests.....	27
8.2.5	Control Code Support	28
8.2.6	No Control When Status Code is Non-Zero	30
8.3	Analog Output Status.....	31
8.3.1	Desired Behavior	31
8.3.2	Test Procedure	31
8.4	Analog Outputs	32
8.4.1	Select Before Operate.....	32
8.4.2	Direct Operate with Acknowledge.....	36
8.4.3	Direct Operate, No Acknowledge	37
8.4.4	Multiple Object Requests.....	38
8.5	Class Data	39
8.5.1	Class 0.....	39
8.5.2	Class 1.....	41
8.5.3	Class 2.....	44
8.5.4	Class 3.....	47
8.5.5	Multiple Object Request	49

8.5.6	Class Assignment Verification	50
8.6	Indications.....	51
8.6.1	Restart.....	51
8.6.2	Bad Function	52
8.6.3	Object Unknown	52
8.6.4	Local	52
8.6.5	Broadcast Address and All Stations Indication	54
8.6.6	Buffer Overflow.....	55
8.7	Time	57
8.7.1	Non-LAN Time Sync Method.....	58
8.7.2	LAN Time Sync Method.....	59
8.8	Cold Restart.....	59
8.8.1	Desired Behavior.....	59
8.8.2	Test Procedure	59
8.9	Application Layer Fragmentation.....	60
8.9.1	Use of FIR, FIN and SEQUENCE in Fragmentation.....	60
8.9.2	Use of Confirmation in Fragmentation	61
8.10	Multi-Drop Support.....	62
8.10.1	Desired Behavior	62
8.10.2	Test Procedure	62
8.11	Unsolicited Responses	62
8.11.1	Desired Behavior	63
8.11.2	Test Procedure	65
8.12	Collision Avoidance	73
8.12.1	Desired Behavior	74
8.12.2	Test Procedure	74
8.13	Binary Inputs Specific Object Requests.....	76
8.13.1	Desired Behavior	76
8.13.2	Test Procedure	76
8.14	Binary Input Change Specific Requests.....	77
8.14.1	Desired Behavior	77
8.14.2	Test Procedure	79

8.15	Common Time of Occurrence	88
8.15.1	Desired Behavior	88
8.15.2	Read for relative time binary change events; Relative time not supported.....	88
8.15.3	Read for Relative Time; Relative time supported	89
8.16	Binary Counters Specific Object Requests	90
8.16.1	Binary Counters, Running	90
8.16.2	Binary Counters, Frozen.....	91
8.17	Binary Counters, Event.....	97
8.17.1	Desired Behavior	97
8.17.2	Test Procedure	97
8.18	Analog Input.....	99
8.18.1	Desired Behavior	100
8.18.2	Test Procedure	100
8.19	Analog Change Event	100
8.19.1	Desired Behavior	100
8.19.2	Test Procedure	101
8.20	Multiple Read Requests	102
8.20.1	Desired Behavior	102
8.20.2	Test Procedure	102
8.21	Double-bit Inputs	103
8.21.1	Disable Double Bit Binaries	103
8.22	Double-bit Input Change.....	104
8.22.1	Disable Double Bit Binaries	104
8.23	Specific Point Ranges	105
8.23.1	Desired Behavior	105
8.23.2	Test Procedure	105
8.24	Specific variations for Static Inputs.....	110
8.24.1	Desired Behavior	111
8.24.2	Test Procedure	111
8.25	Specific Variations for Events.....	118
8.25.1	Desired Behavior	118
8.25.2	Test Procedure	119

8.26	Assign Class	121
8.26.1	Desired Behavior	121
8.26.2	Test Procedures	122
8.26.3	No-Class Assignment Test Procedures	123
9	Network	125
9.1	Overview	125
9.2	Terminology	125
9.3	Scope of Testing	126
9.4	Tests	128
9.5	All Communication Methods	128
9.5.1	TCP Without DNP Unsolicited	128
9.5.2	UDP Solicited	131
9.5.3	UDP Unsolicited	133
9.5.4	Unsolicited with Both UDP and TCP	135
10	Output Control Events	138
10.1	Overview	138
10.2	Behavior to be tested	139
10.3	Binary	139
10.3.1	Setup	139
10.3.2	Binary Status in Group 0	139
10.3.3	Binary Output Status Events	139
10.3.4	Binary Command Events	140
10.4	Analog	141
10.4.1	Setup	141
10.4.2	Analog Status in Group 0	141
10.4.3	Analog Output Status Events	141
10.4.4	Analog Command Events	142
11	New Conformance Tests	144
12	Appendix A – DNP3 Reference Sheets	147

1 Overview

It is the purpose of this document to describe a set of tests that will determine an Intelligent Electronic Device's (IED) compliance with the Distributed Network Protocol, DNP3, also described in IEEE Std 1815™-2012. This certification procedure is designed to determine an IED's compliance to one or all of Subset Levels 1, 2, and 3 defined in IEEE 1815-2012. A device must pass all of the tests relevant to a given subset to be considered compliant to that subset. Tests relevant only to a given subset or subsets will be so identified. Lacking any such identification, a test should be assumed relevant to all three subsets.

1.1 Protocol specification

The protocol is defined by:

- IEEE Std 1815™-2012
- DNP3 Specification Supplement 1 – Device Profile Template and XML Schema
- Technical Bulletins published by the Technical Committee

1.2 Subset levels

If a device is to be tested for conformance to a given subset level, it shall either:

- Not support any features not allowed by subset level being tested, or
- Be configurable to disable support for those features not allowed by the subset level being tested

In some cases, a device may not be required to support all features of a given subset, as long as it does not support features outside the subset. For example, while counter inputs are part of subset level 1, a device can still be conformant if it does not contain any counter input points. However, frozen counters are not part of subset level 1, and a device that returns frozen counters, and cannot be configured to disable that feature, cannot be subset level 1 conformant.

A device can be found to be conformant with all levels 1, 2, and 3. Such determination may require the device to be tested multiple times, changing the configuration for each test to allow only subset conformant responses to be generated. Refer to IEEE 1815-2012, clauses 14.3, 14.4, and 14.5.