

Application Notes Affected: AN2005-004 Rev 1.6
AN2005-005 Rev 1.7
AN2005-006 Rev 1.7
AN2007-001 Rev 1.7

and WITS PSAC Test Specification version 3.1

Bulletin Reference: **TB0062 Iss 6**

Bulletin Type: **Clarifications and corrections**

Status: ~~Circulated for comment / Rejected~~ / **Accepted**

Date Issued: **07-02-2018**

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1 Overview

There are a number of comments and PSAC “tickets” that have been raised because of errors or mis-understandings with the contents of the Application Notes:

1. AN2005-006 has a table showing the changes that were made for the evolving versions of incremental configuration. IC version 5 added record types 1018 and 1019 but the table shows the record names transposed. 1018 should be incident definition and 1019 should be significant change action. In section 1 of AN2005-006 the IC records are listed with references to their section numbers within the note. IC records 1018 and 1019 are missing their section reference numbers and others have the wrong reference numbers.
2. When merging the contents of TB#46 into the Test Specification (version 3.1) test 2.5.11.13 was incorrectly shown as the FD rejecting the IC changes. The correct action is for the FD to accept the changes.
3. AN2007-001 states that when using secure authentication a Field Device must initiate a comms session with a NULL unsolicited response and must not use an unsolicited response containing events. The Test Specification should include tests to cover this requirement.
4. Ticket 39 discusses a Field Devices behaviour when the MasterStation sends control requests to a point that is currently under profile control. It has been agreed that the FD should reject the MS request with status code 10 and that the FD should assert IIN1.5 (local control) when any point is being controlled from a profile. Tests should be added to the Test Specification to test this behaviour.
5. Ticket 46 concerns structures of log files. Vendors have interpreted the log file format in different ways due to unconcise wording and lack of examples. The exact ordering of point definitions and point values is unclear and needs to be shown with examples.
6. Ticket 12 asks if we should put statements in App notes to clarify the point order/timing order of logged data? Currently it is not 100% clear whether all logged info for all points must be a) logged in order of point number and time, b) logged for a point in time order (then another point). Words will be added to the App notes to clarify this, so the ticket should be updated to say “we will put statements in the Apps notes...”
7. Ticket 47 concerns naming of BCF files. AN2007-001 specifically states that the underscore character must only occur once in application filenames but does not state this for bulk configuration filenames. BCF names should only have one underscore character and tests should be added to the Test Specification to ensure the correct use of the BCF version string in the WITS Device Attribute set.
8. Ticket 49 discusses the expected behaviour of a FD when removing local inhibits. There is some confusion in AN2005-005 about the expected behaviour when removing locally applied global inhibits and locally applied individual inhibits. A FD is only expected to report its current “state” if all inhibits have been removed. This also affects the Test Specification section 2.5.7
9. Ticket 50 discusses log file structures when using DNP3 point addresses greater than 255. Tests should be added to the Test Specification to ensure the FD builds the correct log file entries.
10. Ticket 51 has details of inconsistencies in the Application Notes about using persistence and hysteresis when applying or removing overrides. It is agreed that persistence and hysteresis should be applied when applying and removing overrides.

This Technical Bulletin corrects these in the Application Notes and Test Specification.

NB. In section 2 onwards, text that is shown in red represents words to be removed from the application notes and text in blue represents words to be inserted into the notes. Table boxes highlighted in red are showing formatting details and have no relevance for text changes.

2 Changes to the Application Notes

2.1 AN2005-004

Make the following changes to AN2005-004, in addition to those made by TB#61.

2.1.1 Change the “Title Page” as shown:

Revision 1.67 June 2017 July 2017

2.1.2 Add to the “Change History” as shown:

Date	Revision	WITS-DNP3 Version	Details
June 2017	1.7	all	Added notes about associated values when the source point is invalid for the whole calculation period.
July 2017		all	Added clarification and examples of records with different use of Point Definitions. Added clarification to the end of 2.3.4.

2.1.3 Overview topic 5, modify table 2-5 and the following text as shown:

Delete the last entry from table 2-5:

Point definition	Variable	If NoRPD != 0 or NoPD != 0	Present if log header “Number of Record Point definitions” field is present and non-zero, or if record “Number of Point definitions” field is present and non-zero. This field uses the standard DNP3 method for specifying metadata and includes Object Group, Variation, Qualifier and Range. See section Error! Reference source not found. for more information. Where multiple point definitions are present, each new point definition follows the data values of the previous definition (i.e. same format as a DNP3 response containing multiple object definitions).
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Add text as shown (noting that existing table numbers will change as a result of adding the new tables):

The record header is followed by the record data itself:

Table 2-6, Record data structure, NoRPD = 0

Name	Size	Comments
Values	Variable	A single value for each point defined in the point definitions in the same order as they are defined in the point definitions.

Table 2-7, Record data structure, NoRPD = 1 or NoPD = 1

Name	Size	Comments
Point definition	Variable	This field uses the standard DNP3 method for specifying metadata and includes Object Group, Variation, Qualifier and Range. See section 2.4.5 for more information.
Values	Variable	Values for each point defined by the preceding point definition, in the order that they are defined.

Table 2-8, Record data structure, NoRPD > 1 or NoPD > 1

Name	Size	Comments
1st Point definition	Variable	This field uses the standard DNP3 method for specifying metadata and includes Object Group, Variation, Qualifier and Range. See section 2.4.5 for more information.
Values	Variable	Values for each point defined by the preceding point definition, in the order that they are defined.
2nd Point definition	Variable	As above
Values	Variable	Values for each point defined by the preceding point definition, in the order that they are defined.
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Nth Point definition	Variable	As above
Values	Variable	Values for each point defined by the preceding point definition, in the order that they are defined.

Following a header each record will contain a single value for each point defined in the point definitions in the same order as they are defined in the point definitions.

The structures of the data values for the different point types are shown in the tables below.

2.1.4 Overview topic 5, modify section 2.5 as shown (noting that one of the existing example numbers will change as a result of adding new examples):

Ex	Example of a global time log		
2-2	Reading a "global" time log (several points per record) with a sample period of 15 minutes. Here analogue inputs 0-2 and 4-5 are logged.		
	Value	Comment	
	BLOCK 0		
	Preamble	0x01	Version number.
	Block Size	0x65 0x00	Size of block.
	Header	0x00 0x00	No next header.
	Format	0x01	Prefix and header period is used.
	Period	0xA0 0xBB 0x0D 0x00 0x00 0x00	Period of 900,000 ms (15 minutes).
	NoHPD	0x02	2 point definitions in the header.
	Point Definition #1	0x1E 0x05	Object Group 30 Variation 5 (short floating point).
		0x00 0x00 0x02	Qualifier 0, point numbers 0-2.
	Point Definition #2	0x1E 0x05	Object Group 30 Variation 5 (short floating point).
		0x00 0x04 0x05	Qualifier 0, point numbers 4-5.
	Record 1 Prefix	0x03	Prefix DNP3 time follows, Time log
	Time	0x55 0x90 0x78 0x56 0x34 0x12	and DNP3 time of first record.
	1 st point	0x01 0x9A 0x99 0xB1 0x40 0x00 0x03	Analogue inputs 0-2: A10, flags (online), value 5.55, state 0 (normal) & quality 3 (no inhibits).
	2 nd point	0x01 0xB8 0x1E 0xD5 0x40 0x00 0x03	A11, flags (online), value 6.66, state 0 (normal) & quality 3 (no inhibits).
	3 rd point	0x01 0xD7 0xA3 0xF8 0x40 0x02 0x03	A12, flags (online), value 7.77, state 2 & quality 3 (no inhibits).
	4 th point	0x01 0x7B 0x14 0x0E 0x41 0x00 0x03	Analogue inputs 4-5: A14, flags (online), value 8.88, state 0 (normal) & quality 3 (no inhibits).
	5 th point	0x01 0x0A 0xD7 0x1F 0x41 0x03 0x03	A15, flags (online), value 9.99, state 3 & quality 3 (no inhibits).
	Record 2 Prefix	0x02	Prefix: Time 15 minutes after previous sample (Header period), Time log.
	1 st point	0x01 0x9A 0x99 0xB1 0x40 0x00 0x03	Analogue inputs 0-2. A10 flags, value, state and quality A11 flags, value, state and quality A12 flags, value, state and quality
	2 nd point	0x01 0xB8 0x1E 0xD5 0x40 0x00 0x03	
	3 rd point	0x01 0xD7 0xA3 0xF8 0x40 0x02 0x03	
	4 th point	0x01 0x7B 0x14 0x0E 0x41 0x00 0x03	Analogue inputs 4-5. A14 flags, value, state and quality A15 flags, value, state and quality
	5 th point	0x01 0x0A 0xD7 0x1F 0x41 0x03 0x03	

Ex	Another example of a global time log	
2-3	Reading a “global” time log with differing sample periods. Here analogue input 300 is logged, first at 20 minute intervals, then 5 minute intervals.	
	Value	Comment
	BLOCK 0	
	Preamble	0x01 Version number.
	Block Size	0x59 0x00 Size of block.
	Header 1	0x2F 0x00 New Second header follow sing this header & its records.
	Format	0x01 Prefix and header period is used.
	Period	0x80 0x4F 0x12 0x00 0x00 0x00 Period of 1,200,000 ms (20 minutes).
	NoHPD	0x01 1 point definition in the header.
	Point Definition	0x1E 0x05 Object Group 30 Variation 5 (short floating point).
		0x01 0x2C 0x01 0x2C 0x01 Qualifier 1, point number 300.
	Record 1 Prefix	0x03 PrefixDNP3 time follow s, Time log
	Time	0x00 0xA9 0x48 0x2A 0x01 0x01 andDNP3 time of first record.
	1 st point	0x01 0xB6 0xF3 0x9D 0x3F 0x00 0x03 A1300, Flags (online), analogue input value 1.234, state 0 (normal) & quality 3 (no inhibits).
	Record 2 Prefix	0x02 Prefix:Time is 20 minutes after previous sample (Header period), Time log.
	1 st point	0x01 0x7B 0x14 0x9E 0x3F 0x00 0x03 A1300, Flags (online), analogue input value 1.235, state 0 (normal) & quality 3 (no inhibits).
	Record 3 Prefix	0x02 Time is 20 minutes after previous sample (Header period), Time log.
	1 st point	0x01 0x3F 0x35 0x9E 0x3F 0x00 0x03 A1300, Flags (online), analogue input value 1.236, state 0 (normal) & quality 3 (no inhibits).
	Header 2	0x00 0x00 No further headers in this block.
	Format	0x01 Prefix and header period is used.
	Period	0xE0 0x93 0x04 0x00 0x00 0x00 Period of 300,000 ms (5 minutes).
	NoHPD	0x01 1 point definition in the header.
	Point Definition	0x1e 0x05 Object Group 30 Variation 5 (short floating point).
		0x01 0x2C 0x01 0x2C 0x01 Qualifier 1, point number 300.
	Record 1 Prefix	0x03 PrefixDNP3 time follow s, Time log
	Time	0x80 0x97 0x7F 0x2A 0x01 0x01 andDNP3 time of first record.
	1 st point	0x01 0x7B 0x14 0x9E 0x3F 0x00 0x03 A1300, Flags (online), analogue input value 1.235, state 0 (normal) & quality 3 (no inhibits).
	Record 2 Prefix	0x02 Prefix:Time is 5 minutes after previous sample (Header period), Time log.
	1 st point	0x01 0x3F 0x35 0x9E 0x3F 0x00 0x03 A1300, Flags (online), analogue input value 1.236, state 0 (normal) & quality 3 (no inhibits).

Ex	Example of a global time log with minimum, maximum and mean associated values		
2-4	Reading a “global” log with a sample period of 15 minutes. Here analogue input 5 is time logged along with minimum, maximum and mean associated values for each period.		
	Value	Comment	
BLOCK 0			
Preamble	0x01	Version number.	
Block Size	0x63 0x00	Size of block.	
Header	0x00 0x00	No next header.	
Format	0x01	Prefix and header period is used.	
Period	0xA0 0xBB 0x0D 0x00 0x00 0x00	Period of 900,000 ms (15 minutes).	
NoHPD	0x01	1 point definition in the header.	
Point Definition	0x1E 0x05 0x00 0x05 0x05	Object Group 30 Variation 5 (short floating point). Qualifier 0, point number 5.	
Record 1 Prefix	0x73	Prefix and DNP3 time of first record. DNP3 time follows, Time log. Minimum, maximum and mean associated values are included.	
Time	0x55 0x90 0x78 0x56 0x34 0x12	DNP3 time of this record.	
1 st point	0x01 0x00 0x00 0x80 0x3F 0x00 0x03	A15, Flags (online), analogue input value 1.0, state 0 (normal) & quality 3 (no inhibits).	
Minimum value	0x01 0x00 0x00 0x80 0x3F	Flags (online) & minimum value for previous period.	
Maximum value	0x01 0x00 0x00 0x80 0x3F	Flags (online) & maximum value for previous period.	
Mean value	0x01 0x00 0x00 0x80 0x3F	Flags (online) & mean value for previous period.	
Record 2 Prefix	0x72	Prefix: Time 15 minutes after previous sample (Header period), Time log. Minimum, maximum and mean associated values are included.	
1 st point	0x01 0x00 0x00 0x00 0x40 0x00 0x03	Flags (online), analogue input value 2.0, state 0 (normal) & quality 3 (no inhibits).	
Minimum value	0x01 0x00 0x00 0x00 0x40	Flags (online) & minimum value for previous period.	
Maximum value	0x01 0x00 0x00 0x00 0x40	Flags (online) & maximum value for previous period.	
Mean value	0x01 0x00 0x00 0x00 0x40	Flags (online) & mean value for previous period.	
Record 3 Prefix	0x73	Prefix: Re-synced time follows, Time log. Minimum, maximum and mean associated values are included.	
Time	0x66 0x90 0x78 0x56 0x34 0x12	DNP3 time of this record.	
1 st point	0x01 0x00 0x00 0x80 0x40 0x00 0x03	Flags (online), analogue input value 4.0, state 0 (normal) & quality 3 (no inhibits).	
Minimum value	0x01 0x00 0x00 0x80 0x40	Flags (online) & minimum value for previous period.	
Maximum value	0x01 0x00 0x00 0x80 0x40	Flags (online) & maximum value for previous period.	
Mean value	0x01 0x00 0x00 0x80 0x40	Flags (online) & mean value for previous period.	

Ex	Example of global event log		
2-5	Reading a "global" event log.		
		Value	Comment
	BLOCK 0		
	Preamble	0x01	Version number.
	Block Size	0x27 0x00	Size of block.
	Header	0x00 0x00	No next header.
	Format	0x00	Prefix and header period is not present.
	NoHPD	0x00	No point definitions in the header.
	NoRPD	0x01	1 point definition in each record.
	Record 1 Time	0x55 0x90 0x78 0x56 0x34 0x12	DNP3 time of first record.
	Point Definition	0x1E 0x05	Object Group 30 Variation 5 (short floating point).
		0x00 0x05 0x05	Qualifier 0, point number 5.
	1 st point	0x01 0x9A 0x99 0xB1 0x40 0x00 0x07	A15, Flags (online), value 5.55, state 0 (normal) & quality 3 (no inhibits, state change).
	Record 2 Time	0x66 0x90 0x78 0x56 0x34 0x12	DNP3 time of second record.
	Point Definition	0x01 0x02	Object Group 1 Variation 2.
		0x00 0x08 0x08	Qualifier 0, point number 8.
1 st point	0x81 0x07	D18, Flags (online), value 1 & quality 3 (no inhibits, state change).	

Ex	Another example of a global time log with points using 8-bit and 16-bit DNP3 addresses	
2-6	Reading a "global" time log with differing size addresses in the point definitions	
	Value	Comment
	BLOCK 0	
	Preamble	0x01 Version number.
	Block Size	0x59 0x00 Size of block.
	Header 1	0x00 0x00 No next header.
	Format	0x01 Prefix and header period is used.
	Period	0x80 0x4F 0x12 0x00 0x00 0x00 Period of 1,200,000 ms (20 minutes).
	NoHPD	0x00 No point definitions in the header.
	NoRPD	0x00 The number of point definitions is in each record.
	Record 1 Prefix	0x03 DNP3 time follow s, Time log
	Time	0x00 0xA9 0x48 0x2A 0x01 0x01 DNP3 time of first record.
	NoPD	0x02 Two point definitions in this record
	Point Definition #1	0x1E 0x05 Object Group 30 Variation 5 (short floating point).
		0x00 0x08 0x0A Qualifier 0, point numbers 8 - 10.
	1 st point	0x01 0xB6 0xF3 0x9D 0x3F 0x00 0x03 A18, Flags, value, state and quality
	2 nd point	0x01 0x68 0x45 0x81 0x3F 0x00 0x03 A19, Flags, value, state and quality
	3 rd point	0x01 0x45 0x73 0x13 0x3F 0x00 0x03 A110, Flags, value, state and quality
	Point Definition #2	0x1E 0x05 Object Group 30 Variation 5 (short floating point).
		0x01 0x04 0x01 0x05 0x01 Qualifier 1, point numbers 260 and 261
	1 st point	0x01 0x11 0x79 0x31 0x3F 0x00 0x03 A1260, Flags, value, state and quality
	2 nd point	0x01 0x23 0x62 0x78 0x3F 0x00 0x03 A1261, Flags, value, state and quality
	Record 2 Prefix	0x03 DNP3 time follow s, Time log
	Time	0x00 0xB0 0x48 0x2A 0x01 0x01 DNP3 time of second record.
	NoPD	0x01 One point definition in this record
	Point Definition #1	0x1E 0x05 Object Group 30 Variation 5 (short floating point).
		0x00 0x21 0x21 Qualifier 0, point numbers 33.
	1 st (only) point	0x01 0x00 0x00 0x9D 0x3F 0x00 0x03 A133, Flags, value, state and quality

Ex	Example of mixed data log		
2-67	Reading a log where different types are mixed (all point types and all log types).		
		Value	Comment
	BLOCK 0		
	Preamble	0x01	Version number.
	Block Size	0x2F 0x00	Size of block.
	Header	0x00 0x00	No next header.
	Format	0x01	Prefix and header period is present.
	Period	0x00 0x00 0x00 0x00 0x00 0x00	Period of zero, indicates time always with record.
	NoHPD	0x00	No point definitions in the header.
	NoRPD	0x01	1 point definition in each record.
	Record 1 Prefix	0x03	Record is 'time log' and time follows prefix.
	Time	0x55 0x90 0x78 0x56 0x34 0x12	DNP3 time of first record.
	Point Definition #1	0x1E 0x05	Object Group 30 Variation 5 (short floating point).
		0x00 0x05 0x05	Qualifier 0, point number 5.
	1 st point	0x01 0x9A 0x99 0xB1 0x40 0x00 0x03	Flags (online), value 5.55, state 0 (normal) & quality 3 (no inhibits).
	Record 2 Prefix	0x05	Record is 'event log' and time follows prefix.
	Time	0x66 0x90 0x78 0x56 0x34 0x12	DNP3 time of second record.
	Point Definition #1	0x01 0x02	Object Group 1 Variation 2.
		0x00 0x08 0x08	Qualifier 0, point number 8.
	1 st point	0x81 0x07	Flags (online) & value 1, quality 3 (no inhibits, state change).

Ex	Example of mixed data time log		
2-8	Reading a log where records contain a binary point and 2 counter points		
		Value	Comment
	BLOCK 0		
	Preamble	0x01	Version number.
	Block Size	0x50 0x00	Size of block.
	Header	0x00 0x00	No next header.
	Format	0x01	Prefix and header period is present.
	Period	0x00 0x00 0x00 0x00 0x00 0x00	Period of zero, indicates time always with record.
	NoHPD	0x00	No point definitions in the header.
	NoRPD	0x02	2 point definition in each record.
	Record 1 Prefix	0x03	Record is 'time log' and time follows prefix.
	Time	0x55 0x90 0x78 0x56 0x34 0x12	DNP3 time of first record.
	Point Definition #1	0x01 0x02	Object Group 1 Variation 2 (binary point without time).
		0x00 0x14 0x14	Qualifier 0, point number 20.
	1 st point	0x81 0x03	Online state 1, quality 3 (no inhibits, state change).
	Point Definition #2	0x14 0x01	Object Group 20 Variation 1 (32-bit counter with flag).
		0x00 0x00 0x01	Qualifier 0, point numbers 0 and 1.
	1 st point	0x01 0x01 0x00 0x00 0x00 0x00 0x03	Flags (online), value 1, state 0 (normal) & quality 3 (no inhibits).
	2 nd point	0x01 0xFF 0x01 0x00 0x00 0x00 0x03	Flags (online), value 511, state 0 (normal) & quality 3 (no inhibits).
	Record 2 Prefix	0x03	Record is 'time log' and time follows prefix.
	Time	0x55 0xFF 0x78 0x56 0x34 0x12	DNP3 time of second record.
	Point Definition #1	0x01 0x02	Object Group 1 Variation 2 (binary point without time).
		0x00 0x15 0x15	Qualifier 0, point number 21.
	1 st point	0x81 0x03	Online state 1, quality 3 (no inhibits, state change).
	Point Definition #2	0x14 0x01	Object Group 20 Variation 1 (32-bit counter with flag).
		0x00 0x02 0x03	Qualifier 0, point numbers 2 and 3.
	1 st point	0x01 0x10 0x00 0x00 0x00 0x00 0x03	Flags (online), value 16, state 0 (normal) & quality 3 (no inhibits).
	2 nd point	0x01 0xFF 0x0F 0x00 0x00 0x00 0x03	Flags (online), value 4095, state 0 (normal) & quality 3 (no inhibits).

2.1.5 Overview topic 6, add to the end of section 2.3.4:

This means that a Field Device may choose to build a response where all data is presented in chronological order with data for more than one point at a specific instance in time or it may choose to build a response where all data for a specific point is presented (in chronological order) followed by data for other points.

2.2 AN2005-005

Make the following changes to AN2005-005.

2.2.1 Change the “Title Page” as shown:

Revision 1.78

March 2016 July 2017

2.2.2 Add to the “Change History” as shown:

Date	Revision	WITS-DNP3 Version	Details
March 2016	1.7	3.0	Merged SAV2 and SAV5 streams back together. Extended details of the WITS status of analogue points to cover significant changes.
July 2017	1.8	3.1	Clarified the expected behaviour when removing locally applied action inhibits.

2.2.3 Overview topic 8, modify the last page of section 2.8 as shown:

When applying or removing an action inhibit for a point the highest action of all of the enabled limits (analogue or counter points) or all of the states (binary points) **and all** of the DNP3 object flags (all point types) must be performed by the Field Device immediately, irrespective of the state of the “all points” inhibit, to report the current state of the point. This includes when an action inhibit is applied or removed due to an ‘all points’ action inhibit and when an action inhibit is automatically removed by the Field Device when the time out expires.

When the action inhibit status of a point changes (due to newly applying an inhibit or when removing **all** previously applied inhibits) the highest action of all of the enabled limits (analogue or counter points) or all of the states (binary points) and all of the DNP3 object flags (all point types) must be performed by the Field Device immediately to report the current state of the point. Note the highlighted “all” in the previous sentence, showing that an action is only taken when an inhibit is first applied or when removing an inhibit and there are no inhibits remaining on that point. For example, applying an individual inhibit to a point will result in an action being performed for that point. A subsequent application of an “all points” inhibit will NOT have an action performed for this point neither will an action be performed for the point when the “all points” inhibit is removed. This behaviour also applies when an inhibit is automatically removed by the Field Device when the time out expires.

Because the action must be performed immediately this means that the action is performed without applying persistence. For analogue points this also means that the action is performed without applying hysteresis.

A Field Device supporting protocol versions 1.3 / 2.1 or higher may apply action inhibits itself by simulating the receipt of instances of the Action Inhibit Data Set. The Field Device would do this to prevent nuisance data being reported to the Master Station. When a device applies action inhibits itself it must follow the same actions and rules as when processing the receipts of the data set instance:

- It must reflect the current action in the WITS quality flags of the point(s) being inhibited (both in log entries and event data set instances).
- It must reflect the highest permitted action in the bits 10-11 of the Health Check Data Set if the inhibit has been applied to all points.

- When applying or removing an action inhibit locally the highest action of all of the enabled limits (analogue or counter points) or all of the states (binary points) **and all** of the DNP3 object flags (all point types) must be performed by the Field Device immediately, irrespective of the state of the “all points” inhibit, to report the current state of the point.
- When the action inhibit status of a point changes due to the local application or removal of an inhibit the highest action of all of the enabled limits (analogue or counter points) or all of the states (binary points) and all of the DNP3 object flags (all point types) must be performed by the Field Device immediately to report the current state of the point.

2.3 AN2005-006

Make the following changes to AN2005-006, in addition to those made by TB#61.

2.3.1 Change the “Title Page” as shown:

Revision 1.78

March 2016 July 2017

2.3.2 Add to the “Change History” as shown:

Date	Revision	WITS-DNP3 Version	Details
June 2017	1.8	all	Added notes about extended data points when the source point is invalid for the whole calculation period.
July 2017		3.0	Corrected table in the heading pages and added references to records 1018 and 1019 in section 1 (correcting the other reference numbers).
		3.1	Corrected the inconsistency in the notes at the end of section 2.1.2.2 (functionality to be mandated in WITS-DNP3 V3.1). Added notes to 2.1.2.17 (functionality to be mandated in WITS-DNP3 V3.1).

2.3.3 Overview topic 1, correct the table preceding section 1:

5	3.0	1017	High Speed Sampled Data	Changed “Cycle” from hours to number of records.
		1018	Significant Change Action Incident Definition	Introduced
		1019	Incident Definition Significant Change Action	Introduced

2.3.4 Overview topic 1, add the references to the list items in section 1:

- Incident logs ²⁶ (see section 2.1.2.19)
- Significant change of value logs ²⁸ (see section 2.1.2.20)

and ensure all others in the list have the correct reference.

2.3.5 Overview topic 4, add to the end of notes at the end of section 2.1.2.17:

- A Field Device must assert IIN1.5 (LOCAL_CONTROL) as soon as an output point is under profile control.
- As soon as a point is under profile control the Field Device must assert the point's quality flag LOCAL_FORCED.

- Any control output request received from the Master Station for a point that is under profile control must be rejected by the Field Device with status code 10 (AUTOMATION_INHIBIT).

2.3.6 Overview topic 10, correct the notes at the end of section 2.1.2.2:

Notes

- When an override is removed from an analogue input point any configured hysteresis or persistence should be applied if the point may subsequently move from one limit state to another (including the normal state). Similarly, hysteresis and persistence should be applied when overriding an analogue input point. Similarly, when applying or removing overrides with binary input points any configured persistence should be applied.
- The “action” that may be taken as a result of applying an override should be performed at the time that the Field Device is processing the IC record. The “action” that may be taken as a result of removing an override from an input point should be performed when the point is next scanned.
- For analogue or binary input points any configured persistence (and hysteresis for analogue input points) should be applied after the Field Device has removed the override value from the point before any "action" is taken. Similarly, when overriding an analogue or binary input point persistence (and hysteresis for analogue input points) should be applied before any "action" is taken.
- When an override is applied to a counter point (or removed) the point is not assumed to have monotonically increased. Limit processing is applied to the change in the same way as for other point types i.e. assuming the point value has moved directly from its previous value to the override value.

2.4 AN2007-001

Make the following changes to AN2007-001.

2.4.1 Change the “Title Page” as shown:

Revision 1.78

March 2016 July 2017

2.4.2 Add to the “Change History” as shown:

Date	Revision	WITS-DNP3 Version	Details
March 2016	1.7	3.0	Merged SAV2 and SAV5 streams back together. Added a section to 4.8, detailing an optimised use of the protocol. Added IC records 1018 and 1019 to table 4-1
July 2017	1.8	3.1	Added a note about BCF file names and use of underscore and period characters to section 3.1.1.

2.4.3 Overview topic 7, modify the end of the BCF topic in section 3.1.1:

Note: Internally the BCF may consist of one or more separate files, packaged in a vendor specific way, and unpacked on the Field Device in a vendor specific way. From the standards viewpoint the BCF is only ever a single file.

Notes

- Internally the BCF may consist of one or more separate files, packaged in a vendor specific way, and unpacked on the Field Device in a vendor specific way. From the standards viewpoint the BCF is only ever a single file.
- Characters “underscore” and “period” must only be used once in the BCF filename string, delineating the version and extension components of the file name.

3 Changes to the Test Specification

Make the following changes to version 3.1 of the Test Specification, in addition to those made by TB#61:

3.1 Housekeeping

3.1.1 Change the “Title Page” as shown:

Revision 3.12

June 2016 July 2017

3.1.2 Change the revision history as shown:

June 2017	3.2	All	Added more details of expected results to extended data points for the case when there are no valid source point values.
July 2017		All	Corrected the expected result of test 2.5.11.13 Added tests to 2.12 to ensure comms sessions start with a NULL unsolicited message from a FD.
		3.1	Added tests 2.5.9.15 to 2.5.9. (point overrides)

3.2 Overview topic 2

3.2.1 Correct test 2.5.11.13 as shown:

2.5.11.13	From the Master Station, use incremental configuration to modify the DNP3 Object Flag Actions of point 'x'. To do so, download and activate an incremental configuration file containing a DNP3 Object Flags Actions record (record type 1009). In this record, set all “action” elements to 1. Ensure that the details will not be the same as any existing details in the Field Device. Perform this for each of the supported point types.	The IC changes are rejected by the Field Device successfully activated by the Field Device. The IC log file shows the record has been rejected with error code 26.		
			Analogue input:	
			Analogue output:	
			Binary input:	
			Double-bit binary input:	
			Binary output:	
			Counter:	

3.3 Overview topic 3

3.3.1 Add to the start of section 2.12.1 as shown:

Purpose of tests:

This test verifies that the DNP3 authentication mechanism prevents the Master Station and Field Device from communicating with each other without the correct authentication keys.

This test **also** verifies that Master Station and Field Device can communicate if using the correct authentication keys.

This test also verifies that when using unsolicited communications the first unsolicited message from a Field Device is a NULL message.

References in WITS Application Notes:

Application Note	Section
AN2005-001	2.2.4 Security
AN2005-002	2.6.1 Security
AN2007-001	4.8.1 Connections between a Master Station and Field Device 4.10 Implementing DNP3 Secure Authentication (SA)

3.3.2 Add test 2.12.1.3 as shown:

2.12.1.3	Restart the Field Device (or force the Field Device to initiate a communications session). Repeat this test for each type of communications medium or protocol where the Field Device can initiate a communications session.	The first message from the Field Device is a NULL unsolicited message. Network end-point: UDP (IPv4) UDP (IPv6) TCP (IPv4) TCP (IPv6) GSM PSTN		

3.4 Overview topic 4

3.4.1 Add to the start of section 2.5.5 “Purpose of Tests” as shown:

- If a profile is used to control a point that the point’s value follows the current value of profile at different times of the day (not used for protocol version 1.1).
- When a point is under profile control the Field Device shows the quality of the point as LOCAL_FORCED and asserts IIN1.5 (LOCAL_CONTROL).
- Any control output request from the Master Station is rejected with status code 10 (AUTOMATION_INHIBIT).

3.4.2 Add tests 2.5.5.25 to 2.5.5.28 as shown:

2.5.5.25	<p>The following tests are only used for protocol versions 3.1 and higher.</p> <p>Re-configure the Field Device such that there are no Profiles or Profile Control Values in the configuration.</p> <p>From the Master Station, use incremental configuration to define profiles to control the value of analogue and binary output points. To do so, download and activate an incremental configuration file containing the relevant Profile records (record type 1007).</p>	<p>The IC changes are successfully activated by the Field Device.</p> <p>At this time the Field Device reports IIN1.5 as 0 and all output points have their quality flag LOCAL_FORCED set to 0.</p>		
2.5.5.26	<p>From the Master Station, use incremental configuration to set the point under profile control. To do so, download and activate an incremental configuration file containing a Profile Control Value record (record type 1016).</p> <p>Perform tests 2.5.5.26 to 2.5.5.28 for one point type and then repeat them for the other point type.</p>	<p>The IC changes are successfully activated by the Field Device.</p> <p>The Field Device has asserted IIN1.5.</p> <p>The Field Device has asserted the point’s quality flag LOCAL_FORCED.</p> <p style="text-align: right;">Analogue Output</p> <p style="text-align: right;">Binary Output</p>		
2.5.5.27	<p>If the Master Station allows, from the Master Station, send a control output request to change the value of the output point.</p>	<p>The Field Device rejects the request with status code 10.</p> <p style="text-align: right;">Analogue Output</p> <p style="text-align: right;">Binary Output</p>		

2.5.5.28	From the Master Station, use incremental configuration to remove the point from profile control. To do so, download and activate an incremental configuration file containing a Profile Control Value record (record type 1016).	<p>The IC changes are successfully activated by the Field Device.</p> <p>The Field Device has set IIN1.5 to 0</p> <p>The Field Device has cleared the point's quality flag LOCAL_FORCED.</p> <p style="text-align: right;">Analogue Output</p> <p style="text-align: right;">Binary Output</p>		

3.5 Overview topic 7

3.5.1 Add to tests 2.2.3.1 and 2.2.3.2 as shown:

2.2.3.1	<p>From the Master Station download and activate a new bulk configuration file that has a different version to the current configuration in the Field Device. Once the Field Device has restarted the Master Station should automatically read all of the device attributes, including WITS attributes.</p>	<p>The Field Device reports the new bulk configuration file version in WITS attribute 3. This should match the version downloaded by the Master Station.</p> <p>In protocol versions 3.1 and higher the version string does not contain any underscore or period characters.</p>		
2.2.3.2	<p>Locally to the Field Device a new bulk configuration file that has a different version to the current is created and applied. This will be a Field Device specific method. Once the Field Device has restarted the Master Station should automatically read all of the device attributes, including the WITS attributes.</p>	<p>The Field Device reports the new bulk configuration file version in WITS attribute 3. This will not match what is present at the Master Station. The Master Station records the configuration mismatch, allowing the user to allow upload, download or ignore options.</p> <p>In protocol versions 3.1 and higher the version string does not contain any underscore or period characters.</p>		

3.6 Overview topic 8

3.6.1 Add tests 2.5.7.25 to 2.5.7.32 as shown:

2.5.7.25	<p>Ensure all action inhibits have been removed from the Field Device.</p> <p>Apply an inhibit to a point that has an action set at 3.</p> <p>Perform tests 2.5.7.25 to 2.5.7.28 for each of the point types.</p>	<p>The Field Device generates a data set event reporting the current state of the point.</p> <p>Analogue input:</p> <p>Analogue output:</p> <p>Binary input:</p> <p>Double-bit binary input:</p> <p>Binary output:</p> <p>Counter:</p>		
2.5.7.26	Apply an “all points” inhibit.	<p>The Field Device does not generate a data set event for the point inhibited in test 2.5.7.25</p> <p>Analogue input:</p> <p>Analogue output:</p> <p>Binary input:</p> <p>Double-bit binary input:</p> <p>Binary output:</p> <p>Counter:</p>		
2.5.7.27	Remove the “all points” inhibit.	<p>The Field Device does not generate a data set event for the point inhibited in test 2.5.7.25</p> <p>Analogue input:</p> <p>Analogue output:</p> <p>Binary input:</p> <p>Double-bit binary input:</p> <p>Binary output:</p> <p>Counter:</p>		
2.5.7.28	Remove the inhibit from the individual point used in test 2.5.7.25	<p>The Field Device generates a data set event reporting the current state of the point.</p> <p>Analogue input:</p> <p>Analogue output:</p> <p>Binary input:</p> <p>Double-bit binary input:</p> <p>Binary output:</p> <p>Counter:</p>		

2.5.7.29	<p>Apply an “all points” inhibit.</p> <p>Perform tests 2.5.7.29 to 2.5.7.32 for each of the point types.</p>	<p>The Field Device generates a data set event reporting the current state of a point with an action set to 3.</p> <p>Analogue input:</p> <p>Analogue output:</p> <p>Binary input:</p> <p>Double-bit binary input:</p> <p>Binary output:</p> <p>Counter:</p>		
2.5.7.30	<p>Apply an inhibit to a point that has an action set at 3.</p>	<p>The Field Device does not generate a data set event for the point inhibited in test 2.5.7.29</p> <p>Analogue input:</p> <p>Analogue output:</p> <p>Binary input:</p> <p>Double-bit binary input:</p> <p>Binary output:</p> <p>Counter:</p>		
2.5.7.31	<p>Remove the inhibit.</p>	<p>The Field Device does not generate a data set event for the point inhibited in test 2.5.7.29</p> <p>Analogue input:</p> <p>Analogue output:</p> <p>Binary input:</p> <p>Double-bit binary input:</p> <p>Binary output:</p> <p>Counter:</p>		
2.5.7.32	<p>Remove the “all points” inhibit.</p>	<p>The Field Device generates a data set event reporting the current state of the point.</p> <p>Analogue input:</p> <p>Analogue output:</p> <p>Binary input:</p> <p>Double-bit binary input:</p> <p>Binary output:</p> <p>Counter:</p>		

3.7 Overview topic 9

3.7.1 Add test 2.6.1.11 as shown:

2.6.1.11	<p>From the Master Station, download and activate an incremental configuration file to configure a point with a DNP3 address greater than 255 to periodically log data, using a Point Archives record (record type 1005).</p> <p>Perform this for each of the supported point types.</p> <p>From the Master Station:</p> <ul style="list-style-type: none"> • Wait for a multiple of the configured logging interval (see note 1 above). • Read the Field Device's WITS data log. 	<p>The Field Device records sample values in the WITS data log at the expected interval.</p> <p>Analogue input:</p> <p>Analogue output:</p> <p>Counter:</p>		
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3.8 Overview topic 10

3.8.1 Add tests 2.5.9.15 to 2.5.9.21 as shown:

2.5.9.15	<p>The following tests are only used for protocol versions 3.1 and higher.</p> <p>From the Master Station, use incremental configuration to download and activate an incremental configuration file containing an Analogue Limits record (record type 1003). In this record, set both "action" elements to 3. If allowed by the FD, set persistence times different for entering and leaving the limit state (typically 1 and 2 minutes) and set a hysteresis value. Ensure the point's analogue value is in the "normal" state.</p>	<p>The IC changes are successfully activated by the Field Device.:</p>		
2.5.9.16	<p>From the Master Station, download and activate an incremental configuration file to override the Analogue Input point, using an Override Point record (record type 1001). In this record, set the override value to be outside of the Normal state.</p>	<p>The Field Device reports the new Analogue state after the "enter state" persistence has expired.</p>		

2.5.9.17	From the Master Station, download and activate an incremental configuration file to override the Analogue Input point, using an Override Point record (record type 1001). In this record, set the override value to be within the hysteresis band of the Normal state.	The Field Device does not report any change of the Analogue state.		
2.5.9.18	From the Master Station, download and activate an incremental configuration file to remove the override from the Analogue Input point, using an Override Point record (record type 1001).	The Field Device reports the Analogue state as Normal after the "leave state" persistence has expired.		
2.5.9.19	From the Master Station, use incremental configuration to download and activate an incremental configuration file containing a Binary States record (record type 1006). In this record, set both "action" elements to 3. If allowed by the FD, set persistence times different for both of the binary states (typically 1 and 2 minutes).	The IC changes are successfully activated by the Field Device.:		
2.5.9.20	From the Master Station, download and activate an incremental configuration file to override the Binary Input point, using an Override Point record (record type 1001). In this record, set the override state to be the opposite of the current state.	The Field Device reports the new Binary state after the relevant state persistence has expired.		
2.5.9.21	From the Master Station, download and activate an incremental configuration file to remove the override from the Binary Input point, using an Override Point record (record type 1001).	The Field Device reports the new Binary state after the relevant state persistence has expired.		