

# DNP Points List and Implementation Without Voltage and Current Sensing Option

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## DNP Points List for 6801MSS Software

This instruction sheet provides Distributed Network Protocol (DNP) points and DNP implementation information for S&C 6801M Automatic Switch Operators without the Voltage and Current Sensing option.

This Points List section is used with **6801MSSInstaller-6.x.x**. The “x” can indicate any number from 0 to 255. Other related software component version information is found on the *Setup > General > Revisions* screen.

The DNP master station should define 6801M Automatic Switch Operator with the following status, analog input, analog output, and control points:

Point	Count
Status	58
Analog Input	8
Control	16
Analog Output	3
Counter	8

The available DNP Points are listed in tables on pages 2 through 9, in the same order they are presented for selection on the *Setup-Communication-Point Mapping* screens. You can assign 6801M status, data, and control points to any SCADA DNP Point index. Point descriptions begin with a code number that is used to find the detailed definition in this instruction sheet. Refer to the Communication Setup section of S&C Instruction Sheet 1045M-530, *S&C 6801M Automatic Switch Operator: Setup*. The code number for each point description is listed in 1045M-560A (this publication) and is not the SCADA Point index.

For a specific SCADA system, typically all 6801M Automatic Switch Operators operate with the same DNP Point index configuration.

Unless otherwise noted, each point is “on” if the condition is logically true or active.

The Source Address in IntelliLink® Setup Software is now 65432 instead of 1.



## 6801M Status Points

These 6801M Automatic Switch Operator features have multiple Status Points:

**Open or Close:** 1–2.

### 6801M Status Points

Code #	Name—Definition
1	<b>Switch Open</b> —On if the actuator is positioned within the <i>Open</i> actuator limit range, and the most recent switch operation completed without the Switch Operator detecting that the actuator was disengaged from the motor operator rod. Otherwise off.
2	<b>Switch Closed</b> —On if the actuator is positioned within the <i>Open</i> actuator limit range, and the most recent switch operation completed without the Switch Operator detecting that the actuator was disengaged from the motor operator rod. Otherwise off.
3	<b>Motor Operator Disabled (Not Ready)</b> —This bit is set when normal, high-speed operation of the switch is blocked. Otherwise off. This is a summary point. The exact cause of the Motor Disabled alarm can be determined from other status points. If Not Ready for Override (status point 51) is also active, emergency close/open operations are blocked.
4	<b>Automatic Operation Enabled</b> —On when automatic control functions have been enabled via either the faceplate switches or a SCADA command.
5	<b>SCADA Control Enabled</b> —On when the <b>SCADA CONTROL</b> faceplate switch is set to <b>REMOTE</b> . Otherwise off.
6	<b>Overcurrent Fault Detected</b> —On when the fault indicators (optional) have detected a line-fault condition that has not been reset by the SCADA operator. See Status Points 19, 20, and 21 for an indication of which phases have an active fault indication. For a normally closed switch, line fault conditions clear according to the <i>Fault Indicator Reset Strategy</i> on the <i>Setup&gt;General&gt;Automatic Operation</i> screen. For a normally open or normally closed switch, to manually clear the fault: 1. Use <i>Clear Faults</i> command in LCD menu. 2. Use <i>Clear Faults</i> command on the <i>Operation</i> screen. 3. Use faceplate/screenset pre-assigned <b>User Command</b> button to <i>Clear Faults</i> .  <b>NOTE:</b> If the conditions above are met and you reinitialize the switch operator using the setup software or a SCADA operator command, the fault condition also clears.
7	<b>Sectionalizer Tripped</b> —On when any automatic control function has opened the switch. The bit is cleared when the switch is closed for any reason and on reinitialization of the switch operator using the setup software. Otherwise off.
8	<b>Combination Battery</b> —On when the battery is low or bad. This indicates maintenance is required (probably battery replacement). Otherwise off.
9	<b>Maintenance Required</b> —On when some form of maintenance (other than battery replacement) is required. It is set when the battery charger has failed due to overvoltage, when the switch Open/Close contacts are not mutually exclusive. This is a summary bit. The exact cause of the failure can be determined from inspection of other status points. Otherwise off.
10	<b>Open/Close Indication is Inconsistent</b> —On when either both contacts are closed or both contacts are open. Otherwise off.
11	<b>Ac Control Power Not Present</b> —On when ac control power is not available to the battery charger. It indicates the switch operator is operating on battery backup. Otherwise off.
13	<b>Battery System Low</b> —On when battery voltage is low, but the switch will operate. Otherwise off.
14	<b>Battery Bad</b> —On when battery replacement is required, unless the switch operator is operating or has recently been operating on battery power. Otherwise off.
15	<b>Battery Charger Failed</b> —On when the charging voltage applied to the battery system was too high, and the charger has been turned off. Otherwise off.
16	<b>Battery Test in Progress</b> —On when the switch operator is automatically testing the batteries at periodic intervals. During the test, battery voltage fluctuates. Otherwise off.

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## 6801M Status Points—Continued

Code #	Name—Definition
17	<b>Cabinet Door Open</b> —On when the switch operator enclosure door is open. When the door is closed, this bit is cleared, and all power to the faceplate LEDs is turned off. Otherwise off.
18	<b>Temperature Sensor Bad</b> —On when the temperature sensor is reading out of range. Temperature-related correction factors will not be accurate when the sensor is incorrect. Otherwise off.
19	<b>Phase A Overcurrent Fault</b> —On if the fault indicator (optional) for Phase A has recently detected an overcurrent. For a normally closed switch, the bit is cleared according to the <i>Fault Indicator Reset Strategy</i> in the <i>Setup&gt;General&gt;Automatic Operation</i> screen. For a normally open or normally closed switch, to manually clear the fault: 1. Use <i>Clear Faults</i> command in LCD menu. 2. Use <i>Clear Faults</i> command on the <i>Operation</i> screen. 3. Use faceplate/screenset pre-assigned <b>User Command</b> button to <i>Clear Faults</i> . <b>NOTE:</b> If the conditions above are met and you reinitialize the switch operator using the setup software or a SCADA operator command, the fault condition also clears.
20	<b>Phase B Overcurrent Fault</b> —As above for Phase B. Otherwise off.
21	<b>Phase C Overcurrent Fault</b> —As above for Phase B. Otherwise off.
23	<b>Loss of Voltage</b> —On when ac control power is off. Otherwise off.
28	<b>External Temperature Sensor Bad</b> —On when the switch operator's external temperature sensor reads outside of its valid range.
29	<b>Decoupled From Operator</b> —On when the switch operator detects that the switch is decoupled from the operator. It is cleared by entering <i>Align</i> mode and jogging the operator into the operating range.
30	<b>Motor Overload</b> —On when the switch operator detected a motor overload on the last operation. It is automatically cleared on the next operation. The switch operator detects a motor overload by monitoring the voltage and current draw to the motor. The overload causes the motor to shut down after a brief delay, regardless of the output actuator position.
31	<b>Operator Undershoot On Last Operation</b> —On when the switch did not reach a fully open or fully closed position on the last operation. This is usually caused by blockage in the switch contacts or external linkages.
32	<b>Operator Overshoot on Last Close</b> —On when the switch operator traveled too far on the close operation. It is cleared on the next switch operation.
33	<b>Inspection Required</b> —On when inspection of the switch installation is required (after a motor overload, or an undershoot on an open or close operation). This condition prevents normal operation of the switch but allows override operation. It is cleared by clicking the <b>Clear Warnings</b> button found on the <i>Diagnostics&gt;Warnings</i> screen.
34	<b>Calibration Required</b> —On when the output actuator travel limits need to be reset. The condition is set, for example, when an encoder error or and undershoot on the open operations occurs. This condition prevents normal, high-speed operation of the switch but allows emergency-override operation. It is cleared by setting the limits of travel.
35	<b>Unrecoverable Error</b> —On when an internal error has been detected. It is cleared by clicking the <b>Clear Errors</b> button found on the <i>Diagnostics&gt;Errors</i> screen.
36	<b>Motor Overload During Low Torque Operation</b> —On when a motor overload was detected on the last jog operation. It is cleared by clicking the <b>Clear Errors</b> button found on the <i>Diagnostics&gt;Errors</i> screen.
37	<b>Motor Overload During High Torque Operation</b> —On when a motor overload error was detected on a high-speed operation. It is cleared by clicking the <b>Clear Errors</b> button found on the <i>Diagnostics&gt;Errors</i> screen.
38	<b>Internal Bad Command</b> —On when the software has been requested to perform an undefined type of operation. This is an impossible operating condition and should be regarded as a microprocessor failure. It is cleared by clicking the <b>Clear Errors</b> button found on the <i>Diagnostics&gt;Errors</i> screen.

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## 6801M Status Points

### 6801M Status Points—Continued

Code #	Name—Definition
39	<b>Internal Bad State</b> —On when the software has moved into an invalid operating state. This is an impossible operating condition and should be regarded as a microprocessor failure. It is cleared by clicking the <b>Clear Errors</b> button found on the <i>Diagnostics&gt;Errors</i> screen.
40	<b>Bad Encoder Checksum</b> —On when the switch operator detects corruption of the information related to the absolute position of the output actuator. The drive train position is considered invalid and thus requires resetting of the travel limits. It is cleared by clicking the <b>Clear Errors</b> button found on the <i>Diagnostics&gt;Errors</i> screen.
42	<b>Bad Encoder Range</b> —On when the switch operator detected an impossible position of the output actuator (beyond the absolute operating range of the drive train). The drive train position is considered invalid and thus requires resetting of the travel limits. It is cleared by clicking the <b>Clear Errors</b> button found on the <i>Diagnostics&gt;Errors</i> screen.
45	<b>Bad Encoder Runaway</b> —On when substantial motion of the drive train is detected without an operation being underway. Because the drive train gearbox is mechanically self-locking, this generally indicates some form of catastrophic failure of the gearbox or the position encoder.
46	<b>Bad Encoder Drift</b> —On when slight motion of the drive train is detected without an operation being underway. Because the drive train gearbox is mechanically self-locking, this generally indicates some form of catastrophic failure of the gearbox or the position encoder. It is cleared by clicking the <b>Clear Errors</b> button found on the <i>Diagnostics&gt;Errors</i> screen.
47	<b>Overshot Position On Open</b> —On when the switch operator traveled too far on the last open operation. It is cleared by clicking the <b>Clear Errors</b> button found on the <i>Diagnostics&gt;Errors</i> screen.
48	<b>Handle Not Stowed</b> —On when the manual operation handle is not stowed on the faceplate.
49	<b>Max Limit Spacing Exceeded</b> —On when the closed and open travel limits are more than 180° apart. This condition prevents both normal and override operation of the switch. It is cleared by clicking the <b>Clear Warnings</b> button found on the <i>Diagnostics&gt;Warnings</i> screen.
50	<b>Manufacturing Variance Not Set</b> —On when the manufacturing variance setpoints have not been set. It is cleared by clicking the <b>Clear Warnings</b> button found on the <i>Diagnostics&gt;Warnings</i> screen.
51	<b>Not Ready For Override</b> —On when <i>Not Ready</i> conditions that block normal, high-speed operation of the switch cannot be overridden using the emergency close/open operations.
52	<b>Align Mode</b> —On when the switch operator is in <i>Low Speed</i> or <i>Align</i> mode. Active, normal, high-speed switching operations are blocked, and faceplate CLOSE/OPEN operations cause slow or jogging movement of the output actuator. In addition, the faceplate <i>NOT READY</i> LED blinks.
53	<b>Limits of Travel Not Set</b> —On when the closed and/or open travel limit needs to be set.
54	<b>Battery Test Hardware Error</b> —On when a battery test hardware failure has been detected during a battery test. The cause may be a malfunctioning battery test relay, battery load test resistor problem, or a wiring problem. It is cleared by a successful battery test.
56	<b>Sensor Detected Missing Encoder</b> —On when the shaft encoder cable either is disconnected from the PS/IO or is improperly installed, or there is a problem with the cable and/or cable connectors. Otherwise off.
57	<b>Worn Switch</b> —On when the captured current profile exceeded the obstruction current threshold from the 125-ms mark to the 1.6-second mark. Otherwise off. See S&C Instruction Sheet 1045M-550 for details.
58	<b>Knife Switch Not Engaged</b> —On when the knife switch is opened to visibly disconnect the battery power to the motor. Otherwise off. This point is only valid for catalog suffix option “-KS.”
59	<b>Surge Suppressor Tripped</b> —On when the optional lightning surge arrestor module trips. Otherwise off.
60	<b>Switch Disabled Bad Battery</b> —On when switch operator cannot operate because the battery is bad.
62	<b>Interlock Open</b> —On when the key interlock locking bolt is in the extended position and key can be removed. Otherwise off. This point is only valid for catalog suffix options “-L2” and “-L3.”

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## 6801M Status Points—Continued

Code #	Name—Definition
75	<b>Hot Line Tag</b> —On when hot line tag has been applied. Otherwise off.
93	<b>Wi-Fi Is Connected</b> —On when a Wi-Fi connection to the switch operator has been established. Otherwise off.
94	<b>Wi-Fi Intrusion Alarm</b> —On when Wi-Fi module reports replay attack or authentication failure. Turned off by user. See Control Point 16 <i>Clear Wi-Fi Intrusion Alarm</i> .
95	<b>Wi-Fi Disabled by SCADA</b> —On when a Disable Wi-Fi command has been received from Control Point 13. Off when an Enable Wi-Fi command has been received from Control Point 14. Control Point 12 toggles Wi-Fi communication on and off; On when Wi-Fi is disabled, and Off when Wi-Fi is enabled.
96	<b>Warnings</b> —On when there is one or more active Warnings. Otherwise off.
97	<b>Alarms</b> —On when there is an active alarm. Otherwise off.
98	<b>Error</b> —On when there is an active error. Otherwise off.

## 6801M Analog Input Points

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### 6801M Analog Input Points

Code #	Name—Definition
1	<b>90% Voltage Reference Standard</b> —A constant; required by protocol implementation to conform to the remote terminal unit (RTU) standard.
2	<b>0% Voltage Reference Standard</b> —A constant, with a value of zero; required by protocol implementation to conform to the RTU standard.
7	<b>Single-phase Voltage</b> —Voltage is measured using true RMS techniques and scaled to yield a nominal value of 120 Vac. Voltage is reported in units of one sensor count equals 0.1 Vac RMS.
16	<b>Cabinet Temperature</b> —In units of degrees Fahrenheit.
17	<b>Battery Voltage</b> —Nominally 24 Vdc. If ac power is on, this value is updated only during battery testing. If ac power is off, this value is continuously updated. One count equals 0.035 Vdc.
18	<b>External Temperature</b> —Reports the temperature in degrees Fahrenheit. Each count = 1 degree.
19	<b>Switch Actuator</b> —Provides the position of the actuator in angular degrees. Each count = 0.1 degree.
20	<b>Hours Until Battery Low</b> —Provides an approximate time to battery low if no operations are performed. Each count equals 1 hour.

The **Object Type** must be configured on the *Communication>Point Mapping>Controls>DNP Control Point Mapping* screen for each control point when it is mapped. Only the configured Object Type will be accepted and acted on for that control point. Some control points will not work with all Object Types. The available Object Types are listed for each control point.

Control Points related to **Open** or **Close** command:1.

#### 6801M Control Points

Code #	Name—Definition
1	<p><b>Open or Close Switch-SCADA</b>—Issue the Close/Open command to the switch. The Close/Open command may be issued using either the Select/Operate sequence, the Direct Operate function, or the Direct Operate without Ack function. Both Trip and Close are valid for this point.</p> <p><b>NOTE:</b> These commands are ignored if the <i>Not Ready</i> condition (status point 3) is active. These commands are also ignored and return an error if the <b>SCADA CONTROL</b> switch is not in the <b>REMOTE</b> position.</p>
3	<p><b>Clear any Outstanding Overcurrent Fault Conditions Present</b>—This command must be issued using a Pulse On request. The fault condition otherwise remains active according to the <i>Fault Indicator Reset Strategy</i> on the <i>Setup&gt;General&gt;Automatic Operation</i> screen.</p>
4	<p><b>Start Battery Test-SCADA</b>—Begins battery test cycle. Command may be issued using a Pulse-On or Latch-On DNP command. If ac power is available, the battery charger is disconnected for several minutes during the test. If ac power is not available, a brief impedance test is used to evaluate the battery condition.</p>
5	<p><b>Enable/Disable Hot Line Tag-SCADA</b>—Enables or disables the Hot Line Tag profile. Enable command may be issued using a Latch-On or Pulse-On DNP command. Disable command may be issued using the Latch-Off or Pulse-Off DNP command. Latch is the default object type.</p>
6	<p><b>Enable/Disable Automatic Operation</b>—This command must be issued using the Latch On/Off request in the control relay output block. In Automatic mode, the switch operator automatically opens the switch if a preconfigured recloser sequence is recognized after a detected fault.</p> <p><b>NOTE:</b> Automatic operation is not disabled when the faceplate <b>SCADA CONTROL</b> switch is set to <b>LOCAL</b> operation.</p>
9	<p><b>Override Operation with Auto-Reverse</b>—Activates if the automatic reverse feature is enabled. The override operation command may be issued using either the Select/Operate sequence, the Direct Operate function, or the Direct Operate without Ack function.</p>
10	<p><b>Override Operation without Auto-Reverse</b>—The override operation command may be issued using either the Select/Operate sequence, the Direct Operate function, or the Direct Operate without Ack function.</p>
11	<p><b>Exit Align Mode</b>—This command must be issued using a Pulse On request.</p>
12	<p><b>Enable/Disable Wi-Fi</b>—This command disables local Wi-Fi communication.</p>
13	<p><b>Wi-Fi Disable</b>—This command disables local Wi-Fi communication.</p>
14	<p><b>Wi-Fi Enable</b>—This command enables local Wi-Fi communication.</p>
15	<p><b>Wi-Fi Test</b>—Activates Wi-Fi beacon transmitter for troubleshooting purposes.</p>
16	<p><b>Clear Wi-Fi Intrusion Alarm</b>—Clears active intrusion alarm.</p>
17	<p><b>Clear Errors</b>—Clears active errors.</p>
18	<p><b>Clear Warnings</b>—Clears active warnings.</p>
19	<p><b>Clear Alarms</b>—Clears active alarms.</p>

## 6801M Analog Output Points

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### 6801M Analog Output Points

Code #	Name—Definition
1	<b>Application Layer Confirmation Retry Time</b> —Time (100 to 65,535 mSec.) that the switch operator will wait for an application-layer confirmation to an event response message before resending the request for confirmation.
2	<b>Application Layer Confirmation Retry Count</b> —Number of times (0 to 10) the switch operator will send an event response message if a confirmation is not received. This number includes the initial response. The retry count is only in effect when the confirmation process is enabled.
3	<b>Control Point Select Time</b> —During a select-before-operate procedure, the time (10 to 1000 tenths of a second) allowed to elapse between receiving the select function for a point and receiving the operate function for it. If an operate function is not received within this period, the point is de-selected and another select function is required before the point will operate.



### 6801M Counter Points

Code #	Name—Definition
1	<b>Close Operation Count</b> —This is the number of switch operations. The counter is incremented on each Close operation. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
2	<b>Compact Flash Operational Issue</b> —This is the number of compact flash issues. The counter is incremented on each compact flash issue. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
3	<b>Logging Overflow</b> —This is the number of log overflows. The counter is incremented on each log overflow. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
4	<b>Disk Error</b> —This is the number of disk problems. The counter is incremented on each disk problem. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
5	<b>Wi-Fi Intrusion Attempt</b> —This is the number of Wi-Fi intrusion attempts. The counter is incremented on each Wi-Fi intrusion attempt. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
6	<b>Phase A Overcurrent Count</b> —This is the number of Phase A overcurrent counts. The counter is incremented with each new overcurrent. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
7	<b>Phase B Overcurrent Count</b> —This is the number of Phase B overcurrent counts. The counter is incremented with each new overcurrent. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
8	<b>Phase C Overcurrent Count</b> —This is the number of Phase C overcurrent counts. The counter is incremented with each new overcurrent. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.

### 6801M Group 0 Objects

Variation	Variation Name	Definition
242	Device manufacturer's software version	The S&C implementation will return a string containing the MCU Application and MCU EOS. The following is an example of the string that will be returned: "003.003.004.003 060.001.021.043," representing MCU Application 3.3.4.3, MCU EOS 60.1.21.43.
248	Device serial number	The S&C implementation will return a string containing the 6801M serial number. The following is an example of the string that will be returned: 14T000001 (14 is the year, T indicates Toronto, and the rest of the serial number resets to 000001 at the beginning of the next year).

# DNP Implementation

This implementation of DNP and this section of documentation conform to the document DNP V3.00 Subset Definitions, Version 2.00, available from the DNP Users Group.

## Device Profile Description

This following describes the compatibility of S&C's implementation of DNP with other devices:

DNP 3 DEVICE PROFILE DOCUMENT	
Vendor Name: S&C Electric Company	
Device Name: 6801M Automatic Switch Operator	
Highest DNP Level Supported: For Requests - Level 2 For Responses - Level 2	Device Function: ___ Master X 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):  8-Bit Unsigned Integers _____ _____ _____ _____	
Maximum Data Link Frame Size (bytes) Transmitted - 292 Received - 292	Max Application Fragment Size (bytes) Transmitted - 249 Received - 249
Maximum Data link Re-tries: X None ___ Fixed at _____ ___ Configurable, range 1 to 25	Maximum Application Layer Re-tries: ___ None ___ Fixed at _____ X Configurable, range 1 to 25 and infinite
Requires Data Link Layer Confirmation: X Never ___ Always ___ Sometimes If 'Sometimes', when? ___ Configurable If 'Configurable', how?	

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	<input checked="" type="checkbox"/>	None	<input type="checkbox"/>	Fixed	<input type="checkbox"/>	Variable	<input type="checkbox"/>	Config
Complete Appl. Fragment	<input checked="" type="checkbox"/>	None	<input type="checkbox"/>	Fixed	<input type="checkbox"/>	Variable	<input type="checkbox"/>	Config
Application Confirm	<input type="checkbox"/>	None	<input type="checkbox"/>	Fixed	<input type="checkbox"/>	Variable	<input checked="" type="checkbox"/>	Config
Complete Appl. Response	<input checked="" type="checkbox"/>	None	<input type="checkbox"/>	Fixed	<input type="checkbox"/>	Variable	<input type="checkbox"/>	Config

Others \_\_\_\_\_

Attach explanation if 'Variable' or 'Configurable' was checked

(see Note 1 below for explanation)

Sends/Executes Control Operations:

WRITE Binary Outputs	<input checked="" type="checkbox"/>	Never	<input type="checkbox"/>	Always	<input type="checkbox"/>	Sometimes	<input type="checkbox"/>	Config
SELECT/OPERATE	<input type="checkbox"/>	Never	<input type="checkbox"/>	Always	<input checked="" type="checkbox"/>	Sometimes	<input type="checkbox"/>	Config
DIRECT OPERATE	<input type="checkbox"/>	Never	<input type="checkbox"/>	Always	<input checked="" type="checkbox"/>	Sometimes	<input type="checkbox"/>	Config
DIRECT OPERATE - NO ACK	<input type="checkbox"/>	Never	<input type="checkbox"/>	Always	<input checked="" type="checkbox"/>	Sometimes	<input type="checkbox"/>	Config

Count > 1  Never  Always  Sometimes  Config

Pulse On  Never  Always  Sometimes  Config

Pulse Off  Never  Always  Sometimes  Config

Latch On  Never  Always  Sometimes  Config

Latch Off  Never  Always  Sometimes  Config

Queue  Never  Always  Sometimes  Config

Clear Queue  Never  Always  Sometimes  Config

Attach explanation if 'Sometimes' or 'Configurable' was checked

(see Note 2 below for explanation)

# DNP Implementation

FILL OUT THE FOLLOWING ITEM FOR MASTER DEVICES ONLY:	
Master Expects Binary Input Change Events: <input 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)	
FILL OUT THE FOLLOWING ITEMS FOR SLAVE DEVICES ONLY:	
Reports Binary Input Change Events when no specific variation requested: <input type="checkbox"/> Never <input type="checkbox"/> Only time-tagged <input checked="" type="checkbox"/> Only non-time-tagged <input type="checkbox"/> Configurable to send both	Reports time-tagged Binary Input Change Events when no specific variation requested: <input type="checkbox"/> Never <input checked="" type="checkbox"/> Binary Input Change with Time <input type="checkbox"/> Bin In Change Relative Time <input type="checkbox"/> Configurable (explain)
Sends Unsolicited Responses: <input type="checkbox"/> Never <input checked="" type="checkbox"/> Configurable (explain) <input type="checkbox"/> Only certain objects <input type="checkbox"/> Sometimes (explain) <input type="checkbox"/> ENABLE/DISABLE UNSOLICITED Function codes supported (see Note 3 below)	Sends Static Data in Unsolicited Responses: <input type="checkbox"/> Never <input type="checkbox"/> When Device Restarts <input checked="" type="checkbox"/> When Status Flags Change  No other options are permitted.  (see Note 3 below)
Default Counter Object/Variation: <input type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (explain) <input checked="" type="checkbox"/> Default Object - 20 Default Variation - 5 <input type="checkbox"/> Point-by-point list attached	Counters Roll Over at: <input type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (explain) <input checked="" type="checkbox"/> 16 Bits <input type="checkbox"/> 32 Bits <input type="checkbox"/> Other Value _____ <input type="checkbox"/> Point-by-point list attached
Sends Multi-Fragment Responses (Slave Only): <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

**NOTE 1: Timeouts While Waiting for Confirmations**

When an application layer response confirmation is requested, the switch operator waits before sending another response/confirmation attempt (if the retry number has not been reached) or stopping the confirmation process.

You can set the *Time Delay Between Retries* with the setup software or via SCADA. (See the Setup chapter for more details.)

**NOTE 2: Control Operations Executed**

For all Binary Output Relay operations and Analog Output operations, the allowed control functions are:

- Select/Operate
- Direct Operate
- Direct Operate No Ack

The master station can choose which of these three functions to use at any given time.

You must use the *Trip/Close* bits for these functions in the Control Block. Set the *Count* value to “1” and the *Code* value to “NUL” (0) or “1.” The switch operator ignores the *On-Time* and *Off-Time* values and the *Queue* and *Clear* flags in the Control Code.

For all momentary point operations, you must use the *Pulse On* function. When using *Pulse On*, set the *Count* value to “1” and the *Code* value to “1.” Set the *Trip/Close* to “NUL” (00). The switch operator ignores the *On-Time* and *Off-Time* values and the *Queue* and *Clear* flags in the Control Code.

For all latching point operations, you can use either the *Latch On* or *Latch Off* function. For either function, set the *Count Value* in the Control Block to “1.” Set the *Code* value to “3” for *Latch On* or “4” for *Latch Off*. Set the *Trip/Close* to “NUL” (00). The switch operator ignores the *On-Time* and *Off-Time* values and the *Queue* and *Clear* flags in the Control Code.

For more details, see the *Control Relay Output Block* section of the document object library in the *DNP V3.00 Basic 4 Document Set*, available from the DNP Users Group.

**NOTE 3: Unsolicited Responses**

The switch operator returns unsolicited responses to the configured master station address when a change occurs in any mapped status point or when the device is restarted. The data returned is object 2, variation 2 (“Binary Input Change with Time”).

You enable and disable unsolicited responses from the setup software or via SCADA (function code 20 to enable, function code 21 to disable).

## DNP Implementation

### Implementation Table

This section describes which objects and requests this implementation accepts and which responses are returned. Object, Variation, and Qualifier Codes in the request must exactly match what is expected; otherwise, the switch operator flags an error. All application layer responses use the standard response function code 129.

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
1	0	Binary Input - All Variations	1	06	
1	1	Binary Input			00
2	0	Binary Input Change - All Variations	1	06,07,08	
2	1	Binary Input Change without Time	1	06,07,08	17
2	2	Binary Input Change with Time (see Note 4)	1	06,07,08	17
2	3	Binary Input Change with Relative Time (object parsed but no data to return)	1	06,07,08	17
10	0	Binary Output - All Variations	1	06	
10	1	Binary Output (object parsed but WRITE not used)	2	17, 28	
10	2	Binary Output Status (only the on-line bit is used)			00
12	1	Control Relay Output Block	3,4,5,6	17,28	echo of request

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
20	0	Binary Counter - All Variations	1,7,8,9,10	06	
20	6	16-Bit Binary Counter without Flag			00
21	0	Frozen Counter - All Variations	1	06	
21	10	16-Bit Frozen Counter without Flag			00

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
22	0	Counter Change Event - All Variations	1	06,07,08	
30	0	Analog Input - All Variations	1	06	
30	4	16-Bit Analog Input without Flag			00
32	0	Analog Change Event - All Variations (object parsed but no data to return)	1	06,07,08	
40	0	Analog Output Status - All Variations	1	06	
40	2	16-Bit Analog Output Status			00
41	2	16-Bit Analog Output Block	3,4,5,6	17,28	echo of request
50	1	Time and Date	2	07 where quantity = 1	IINs only
60	1	Class 0 Data	1	06	
60	2	Class 1 Data	1	06,07,08	
60	3	Class 2 Data (object parsed but no data to return)	1	06,07,08	
60	4	Class 3 Data (object parsed but no data to return)	1	06,07,08	
80	1	Internal Indications	2	00 index=7	IINs only
102	0	8-Bit Unsigned Integer (see Note 6)	1	04	04
102	1	8-Bit Unsigned Integer (see Note 6)	1,2	03,04,05	04
No Object			13		
No Object			23		

## DNP Implementation

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### **NOTE 4: Binary Input Change with Time**

This is the default object returned in the unsolicited report by exception (if enabled) and the default object for a Class 1 data request.

### **NOTE 5: Binary Output Status**

In a response to a Binary Output Status request, the switch operator returns a status byte for each control point available. In this implementation of the Binary Output Status object, only the Online bit is used. All other bits, including the State bit, should be ignored.

You can inspect the state of all digital points (controlled and not controlled) by using the Binary Input object.

### **NOTE 6: Polling Class**

DNP points are assigned to polling classes. S&C Automatic Switch Controls implement Class 0 for static data and Classes 1, 2, and 3 for event data. The Class 0 poll response contains all DNP points that have been assigned to Classes 0, 1, 2 or 3 and their most recent static value. The Class 1, 2 or 3 polls return event data, any DNP point whose value has changed since the last event response message was transmitted. Polling frequency is an aspect of the user's SCADA system and is user selectable.

DNP Point Mapping is user configurable, and all points do not need to be mapped. DNP Points can be customer assigned to any of the DNP Event Classes 1, 2, and 3.