DNP Points List and Implementation

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DNP Points List for 5801 Controls

This instruction sheet provides DNP points and DNP implementation information for S&C 5800 Series Automatic Switch Controls applied in an S&C IntelliTeam II Automatic Restoration System. Points are listed separately for 5801 Controls and for 5802/3 Controls.

This Points List section is used with **SNCD2B1X Rev. 2.45 or USBD2V1X Rev. 2.43**.

The DNP master station should define 5801 Control with the following status, analog input, analog output, and Control Points:

Point	Count
Status Points	47
Analog Inputs	26
Analog Outputs	4
Binary Counter	1
FrozenCounter	1
Control Outputs	10

Unless otherwise noted, each point is set if the condition is logically true or active.

5801 STATUS POINTS	
Point #	**Name—Definition**
0	**Switch 1 Open—**On when contact status is open. Otherwise off.
1	**Switch 1 Closed—**On when contact status is closed. Otherwise off.
2	**Switch 1 Disabled—**On when switch operation is disabled, which may occur on two conditions: when the visual disconnect is open (Status Point 4), or if the battery is bad (Status Point 14).
3	**Automatic Operation Enabled—**On when automatic control functions have been enabled via either the faceplate switches, or a SCADA command.
4	**Visual Open Contact Status on a ScadaMate—**Is set if all of the following are true: • Visual Open auxiliary contacts are present. • The *Switch Visual Disconnect Contacts* in the software: *SETUP: Sensor Configuration* screen is set to PRESENT. • The Visual Disconnect is physically OPEN.
5	**REMOTE/LOCAL Faceplate Switch Position—**This bit is set when the switch is in the **REMOTE** position. In the **REMOTE** position, local operation of the switch from the faceplate is blocked. In the **LOCAL** position, operation of the switch from the SCADA master station is blocked.
6	**Overcurrent Fault Detected—**This bit is set if the fault detection circuitry has detected a line fault condition which has not been reset by the SCADA operator. Line fault conditions clear automatically when three-phase line voltage has been sensed, the switch is closed, and 45 minutes have elapsed, or the faceplate **REMOTE/LOCAL** switch is toggled. If the conditions above are met and you reinitialize the Switch Control using IntelliLink Setup software or a *Reset* command is sent via SCADA, the fault condition also clears.
7	**Sectionalizer Tripped—**This bit is set if any automatic control function has opened the switch. The bit is cleared when the switch is closed for any reason, and is also cleared on reinitialization of the Switch Control using the Setup software, or is cleared when you toggle the **REMOTE/LOCAL** switch.
8	**Battery Maintenance Is Required—**Unless the Switch Control is operating or has recently been operating on battery power, this bit indicates that maintenance is required (probably battery replacement).
9	**Maintenance Required—**This bit is set when some form of maintenance (other than battery replacement) is required. It is set when the battery charger has failed due to over voltage, 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 the inspection of other Status Points.
10	**Open/Close Switch Position Indication Is Inconsistent—**This bit is set if either both contacts are closed, or both contacts are open.
11	**Control Power Failure—**This bit is set if ac control power is not available to the battery charger. It indicates that the Switch Control is operating on battery backup.
12	**Operator Failure Override Set—**This bit is set after the operator has executed the Failure Override Latch On control command to let the switch be operated even if battery is bad. The bit remains set until the override is disabled using the Failure Override Latch Off command. Also, the Status Point will go off, and Failure Override will become disabled, after a 15-minute timeout, if it was not already turned off by the Latch Off command.
13	**Battery System Low—**The battery voltage is low, but the switch will operate.
14	**Battery System Bad—**The battery voltage is too low to operate the switch. This condition blocks the operation of the switch unless the *Failure Override* bit is set. The “bad” battery status is only set when the battery voltage is definitely too low to operate the switch.
15	**Battery Charger Has Failed—**The charging voltage applied to the battery system was too high when the charger was connected, and the charger has been turned off.

5801 STATUS POINTS—Continued	
Point #	**Name—Definition**
16	**Battery Test in Progress—**The Switch Control automatically performs a test procedure on the batteries at periodic intervals. During the test, the battery voltage fluctuates.
17	**Cabinet Door Open—**This bit is set if the door to the Switch Control enclosure is ajar. When the door is closed, this bit is cleared and all power to the faceplate LEDs is turned off.
18	**Temperature Sensor Bad—**The temperature sensor in the Switch Control is reading out of range. When the sensor is reading incorrectly, various temperature-related correction factors will not be accurate.
19	**Phase A, Overcurrent Fault—**This bit is set if the peak current measured on Phase A has exceeded the programmed threshold level continuously for at least the programmed period of time. For a normally closed switch, the bit is cleared automatically once ac power has been restored to all phases, the switch is closed, and 45 minutes have elapsed or the faceplate REMOTE/LOCAL switch is toggled. For the normally open switch, you can toggle the REMOTE/LOCAL switch to clear the condition while the line switch is open or closed. **NOTE:** If the conditions above are met and you reinitialize the Switch Control using the Setup software or a SCADA operator command, the fault condition also clears.
20	**Phase B, Overcurrent Fault—**As above, for Phase B.
21	**Phase C, Overcurrent Fault—**As above, for Phase C.
22	**Overcurrent Ground Fault—**As above, for ground.
23	**Voltage Sensor Shows Loss of Voltage for Any Configured Voltage Channel—**For example, a ScadaMate may be configured with either one, three, or six voltage sensors.
24	**Phase A, Current Direction—**This bit is set if the current on Phase A is flowing in the direction opposite to the "normal" direction configured in the Switch Control. The Switch Control identifies reverse current when the voltage-current phase angle deviates more than 90 degrees from the value set during installation for unity power factor.
25	**Phase B, Current Direction—**As above, for Phase B.
26	**Phase C, Current Direction—**As above, for Phase C.
27	**Application Layer Confirmation Request—**This bit is set when requests for application layer confirmations by the Switch Control are enabled. If enabled, the Switch Control requests a confirmation of receipt from the master station for every change event data response generated. If the Switch Control does not receive a confirmation within the "Time Delay Between Attempts," it issues another data response with request for confirmation. The "Number of Confirmation Attempts" setpoint determines the maximum number of times the Switch Control will reissue a request if it does not receive a confirmation.
28	**Data Link Layer Confirmation Request—**Similar to the above, this bit is set when requests for data link layer confirmations by the Switch Control are enabled.
29	**Team Member Not Transfer Ready—**Active only for the reporting Switch Control. This bit is set when a switch operation is not consistent with the expected team operation (i.e., incomplete or manual switch operation). This point is also active if: the Switch Control is disabled (see Status Point 2), automatic operation is disabled (see Status Point 3), or the switch position is inconsistent (see Status Point 10). This point may be used in conjunction with the "Not All Teams Transfer Ready" Status Point 30 to identify the specific team member where a problem exists.

5801 STATUS POINTS—Continued	
Point #	**Name—Definition**
30	**Not All Teams Transfer Ready—**Active if any teams in which the Switch Control participates are not fully operational. This may be due to error conditions at individual team members (see Status Point 29), or team wide conditions such as isolation of a fault, team configuration errors, team coordination errors, automatic restoration prohibited (see Status Point 34), and team logic disabled on the *TEAM:Setup* screen. If Status Point 29 is set in one Switch Control of a team, this will cause Status Point 30 to be set in the other team members. (See Transfer Ready Status Point Illustration—Figure 1 on page 29 and Table 1 on page 30.) **NOTE:** Unless otherwise prohibited, team member Switch Controls will revert to standalone sectionalizing logic when Not Transfer Ready is active in all teams that the control participates in, whether due to local conditions or conditions at adjacent team members.
31	**Automatic Transfer Operation in Progress—**True if any team defined in the control is actively performing an automatic transfer operation.
32	**Automatic Return to Normal Operation in Progress—**True if any team defined in the control is actively performing a Return-To-Normal operation.
33	**Setup Data Revision—**True whenever the setup configuration data for any enabled team defined in the control is modified. It remains true until the Team Setup parameter on the SETUP: Team screen has been toggled from Stopped back to Running for any team where the setup data has been changed.
34	**Automatic Circuit Restoration Prohibited by SCADA—**This point will be set when this Switch Control has received the command to prohibit load restoration (see Control Point 8) from the SCADA master, or the feature has been enabled on the Prohibit Restoration screen in the Miscellaneous Operation menu. While this point is set, no switch on any team in which this Switch Control participates will be allowed to automatically close, preventing automatic load restoration. This point will be cleared when the Prohibit Restoration feature is latched off with a command from the SCADA master (see Control Point 8), or disabled on the Prohibit Restoration screen in the Miscellaneous Operation menu.
35	**Automatic Circuit Restoration Prohibited by Team Timer—**This point will be set when a team transfer process timer has expired in this Switch Control, resulting in the Prohibit Restoration feature being enabled, for at least one of the teams in which this Switch Control participates. Only a team for which this timer has expired will be prohibited from further automatic load restoration. This point will be cleared when the Prohibit Restoration feature is latched off with a command from the SCADA master (see Control Point 8), or disabled on the Prohibit Restoration screen in the Miscellaneous Operation menu.
36	**Source Loading Data Is Active—**This point will be set when the real-time feeder loading logic is active and in use. This point does not indicate whether the control is using actual real-time feeder loading data received from a DNP master, or using the Default Source Segment Loading setting.
37	**Real-Time Load Data May Be Old or Abnormal—**This point is set when the DNP analog output value received is less than the real-time three-phase total load as sensed by the switch, and is also set if the real-time feeder loading data has not updated within the configured time interval. This point will be set to 0 if the real-time feeder loading logic is inactive (Status Point 36 = 0).
38	**Team 1 in Ready—**Active when the team is in the Ready to Transfer state. This point will be inactive if the team is not in use, contains an error condition, or the line section represented by the team contains a fault.
39	**Team 2 in Ready—**Active when the team is in the Ready to Transfer state. This point will be inactive if the team is not in use, contains an error condition, or the line section represented by the team contains a fault.
40	**Team 3 in Ready—**Active when the team is in the Ready to Transfer state. This point will be inactive if the team is not in use, contains an error condition, or the line section represented by the team contains a fault.
41	**Team 4 in Ready—**Active when the team is in the Ready to Transfer state. This point will be inactive if the team is not in use, contains an error condition, or the line section represented by the team contains a fault.

5801 STATUS POINTS—Continued	
Point #	**Name—Definition**
42	**Team 5 in Ready—**Active when the team is in the Ready to Transfer state. This point will be inactive if the team is not in use, contains an error condition, or the line section represented by the team contains a fault.
43	**Team 6 in Ready—**Active when the team is in the Ready to Transfer state. This point will be inactive if the team is not in use, contains an error condition, or the line section represented by the team contains a fault.
44	**Team 7 in Ready—**Active when the team is in the Ready to Transfer state. This point will be inactive if the team is not in use, contains an error condition, or the line section represented by the team contains a fault.
45	**Team 8 in Ready—**Active when the team is in the Ready to Transfer state. This point will be inactive if the team is not in use, contains an error condition, or the line section represented by the team contains a fault.
46	**Hot Line Tag Set—**Active when Hot Line Tag is set. (This point only exists in SNCD2B1X Rev. 2.45, or later revision software.)

5801 ANALOG INPUT POINTS	
Point #	**Name—Definition**
0	**90% Voltage Reference Standard—**A constant, required by protocol implementation to conform to the RTU standard.
1	**0% Voltage Reference Standard—**A constant, with a value of zero, required by protocol implementation to conform to the RTU standard.
2	**Neutral Current**—Taken as the vector sum of the phase currents on Phases A, B, and C. Current is measured using true RMS techniques and reported in units of one count equals one ampere.
3	**Current Phase A—**Single-phase true RMS current measured on Phase A. Each count equals one ampere.
4	**Current Phase B—**Single-phase true RMS current measured on Phase B. Each count equals one ampere.
5	**Current Phase C—**Single-phase true RMS current measured on Phase C. Each count equals one ampere.
6	**Voltage Phase A—**Voltage is measured using true RMS techniques and scaled to yield a nominal value of 120 Vac. Configuration of the Switch Control at installation time provides the scaling factors such as voltage transformer turn ratio, etc. In cases where loads are connected in a delta (phase-to-phase) configuration, the Switch Control's Sensor Conditioning module is jumpered to yield phase-to-phase voltage readings. Voltage is reported in units of one sensor count equals 0.1 Vac RMS.
7	**Voltage Phase B—**As above, for Phase B.
8	**Voltage Phase C—**As above, for Phase C.
9	**Phase Angle on Phase A—**Each count equals one-eighth degree.
10	**Phase Angle on Phase B—**As above, for Phase B.
11	**Phase Angle on Phase C—**As above, for Phase C.
12	**Single-Phase kVARs Phase A—**kVARs (volt-amperes, reactive) are calculated from single-phase true RMS voltage and current sensor values and the respective voltage-current phase angle. Each count equals one kVAR.
13	**Single-Phase kVARs Phase B—**As above, for Phase B.
14	**Single-Phase kVARs Phase C—**As above, for Phase C.
15	**Cabinet Temperature**—In units of °F.
16	**Battery Voltage**—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.
17	**Single-Phase kW Phase A**—The kW value is calculated from single-phase true RMS voltage and current sensor values. Each count equals one kW.
18	**Single-Phase kW Phase B**—As above, for Phase B.
19	**Single-Phase kW Phase C**—As above, for Phase C.
20	**Single-Phase kVA Phase A—**The kVA value is calculated from single-phase true RMS voltage, current sensor values, and the respective voltage-current phase angle. Each count equals one kVA.
21	**Single-Phase kVA Phase B—**As above, for Phase B.
22	**Single-Phase kVA Phase C—**As above, for Phase C.

5801 ANALOG INPUT POINTS—Continued	
Point #	**Name—Definition**
23	**Total kVARs—**Sum of kVAR Phase A, kVAR Phase B, and kVAR Phase C. Each count equals one kVAR.
24	T**otal kW—**Sum of kW Phase A, kW Phase B, and kW Phase C. Each count equals one kW.
25	**Total kVA—**Sum of kVA Phase A, kVA Phase B, and kVA Phase C. Each count equals one kVA.

5801 ANALOG OUTPUT POINTS	
Point #	**Name—Definition**
0	**Application Layer Confirmation Retry Time—**This is the length of time the Switch Control waits for an application layer confirmation on a response message before resending the response. It uses "timer byte format. " The retry time is only in effect when the confirmation process is enabled. **NOTE:** In "timer byte format," the top two bits are the time units (0 = tenths of seconds, 1 ($40) = seconds, 2 ($80) = minutes, 3 ($C0) = hours). The bottom 6 bits are the count. A value of 1 second ($41) can be more accurately specified as 10 tenths ($0A). A value of 1 minute ($81) can be specified as 60 seconds ($7C). A value of 1 hour ($C1) can be specified as 60 minutes ($BC). The value $FF generates an "infinite" time value.
1	**Application Layer Confirmation Retry Count—**This is the number of times the Switch Control sends a response message without receiving a confirmation. This number includes the initial response. The retry count is only in effect when the confirmation process is enabled.
2	**Control Point Select Time—**During a Select-Before-Operate procedure, this is the length of time that may elapse between receiving the Select function for a point and receiving the Operate function for that same point. If an Operate is not received within this time period, the point is deselected and another Select is required before the point will operate. It uses "timer byte format."
3	**Real-Time Feeder Loading—**A DNP device with real-time feeder loading data can use this analog output point to inform the Switch Controls in a team of the total averaged three-phase feeder loading measured at the breaker in amps. The team(s) can then use this real-time loading data to determine more accurately whether transferring load can be accomplished safely. Each count equals one ampere.

5801 BINARY COUNTER POINTS	
Point #	**Name—Definition**
0	**Operation Counter—**This is the number of switch operations. The counter is incremented on each Close operation. This is a 16-bit counter and will overflow back to zero at 65,535.

5801 FROZEN COUNTER POINTS	
Point #	**Name—Definition**
0	**Frozen Operation Counter—**This is the number of switch operations before the operation counter received a Freeze command.

5801 CONTROL POINTS	
Point #	**Name—Definition**
0	**Open or Close—SCADA—**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.
1	**Issue the Shots-to-Lockout Command—**This command may be issued using either the Select/Operate sequence, the Direct Operate function, or the Direct Operate without Ack function. Only a Close command is valid for this point. This command is ignored and returns an error if the switch is not open, or automatic operation is not enabled.
	NOTE: (Points 0 and 1): These commands are ignored and return an error if a bad battery condition is active and the Failure Override command has not been issued, or if the visual disconnect is open. These commands are ignored if the **REMOTE/LOCAL** switch is not in the **REMOTE** position.
2	**Clear Any Outstanding Overcurrent Fault Conditions Present—**This command must be issued using a Pulse On request. The fault condition otherwise remains active for 45 minutes after the switch is closed and ac power is fully restored, or until the **REMOTE/LOCAL** switch is toggled.
3	**Begin a Battery Test Cycle—**This command must be issued using a Pulse On request. If ac power is on, the charger is disconnected for several minutes while the test is in progress. If ac power is off, a brief battery impedance test evaluates the battery condition.
4	**Enable/Disable Failure Override Status—**This command must be issued using the Latch On/Off request in the control relay output block. This allows Open and Close commands to be processed even if the switch *Not Ready* condition is active.
5	**Enable/Disable Automatic Operation—**This command must be issued using the Latch On/Off request in the control relay output block. In "Automatic" mode, the Switch Control automatically opens the switch if a preconfigured recloser sequence is recognized after a detected fault. **NOTE:** Automatic operation is not disabled by the faceplate REMOTE/LOCAL switch being in the LOCAL position.
6	**Enable/Disable Application Layer Confirmations—**This command must be issued using the Latch On/Off request in the control relay output block. When enabled, the Switch Control requests a confirmation from the master station for every response message generated.
7	**Enable/Disable Data Link Layer Confirmations—**This command must be issued using the Latch On/Off request in the control relay output block. When enabled, the Switch Control uses "confirmed user data" packets for all messages originated by the Switch Control.
8	**Prohibit Automatic Circuit Restoration—**This command must be issued using the Latch On/Off request in the control relay output block. When latched this command will prevent the local switch, and any switches in any team in which this Switch Control participates, from automatically closing to restore load under any circumstances.
9	**Set/Clear Hot Line Tag—**A Latch On command is used to set the hot line tag and the corresponding point 9 Latch Off command is used to clear the tag. If present circumstances prevent the hot line tag from being set when the Latch On command is received, the control will return a hardware error response. The control will accept SELECT, OPERATE, DIRECT OPERATE, and DIRECT OPERATE WITH NO ACKNOWLEDGE forms of the command. (This point only exists in SNCD2B1X Rev. 2.45, or later revision software.) **NOTE:** This DNP Control Point is the only means of setting or clearing the hot line tag status.

DNP Points List for 5802 and 5803 Controls

This Points List section is used with **PADD2B1X Rev. 2.43**.

The DNP master station should define 5802/3 Controls with the following status, analog input, analog output, and Control Points:

Point	Count
Status Points	63
Analog Inputs	40
Analog Outputs	4
Binary Counter	3
Frozen Counter	3
Control Outputs	14

Unless otherwise noted, each point is set if the condition is logically true or active.

5802/3 STATUS POINTS	
Code #	**Name—Definition**
0	**Switch 1 Open—**On when contact status is open. Otherwise off.
1	**Switch 1 Closed—**On when contact status is closed. Otherwise off.
2	**Switch 2 Open—**On when contact status is open. Otherwise off.
3	**Switch 2 Closed—**On when contact status is closed. Otherwise off.
4	**Switch 3 Open—**On when contact status is open. Otherwise off.
5	**Switch 3 Closed—**On when contact status is closed. Otherwise off.
6	**NA**
7	**Switch 1 Disabled—**This bit is set when switch operation is disabled, which may occur on two conditions: when the battery is bad (Status Point 22), or when the LOCAL/REMOTE switch in the motor operator cabinet is set to LOCAL. The 5802/5803 Switch Control has no ability to command switch operation when the motor operator switch is set to LOCAL.
8	**Switch 2 Disabled—**As above, for Switch 2.
9	**Automatic Operation Enabled—**This bit is set if automatic control functions have been enabled via either the faceplate switches or SCADA control command.
10	**REMOTE/LOCAL Faceplate Switch Position—**This bit is set when the switch is in the REMOTE position. In the REMOTE position, local operation of the switch from the faceplate is blocked. In the LOCAL position, operation of the switch from the SCADA master station is blocked.
11	**Overcurrent Fault Detected Switch 1—**On when the fault detection circuitry has detected a line fault condition which has not been reset by the SCADA operator. For a normally closed switch, line fault conditions clear automatically once three-phase line voltage has been sensed, the switch is closed, and 45 minutes have elapsed. For a normally open or normally closed switch, to manually clear the fault: 1. Use *Clear Faults* command in LCD menu, 2. Use *Clear Faults* command on *Setup-Site Related* screen, 3. Use faceplate/screenset pre-assigned **User Command** button to *Clear Faults*. **NOTE:** If the conditions above are met and you reinitialize the Switch Control using the Setup software or a SCADA operator command, the fault condition also clears.
12	**Overcurrent Fault Detected Switch 2—**As above, for Switch 2. Otherwise off.
13	**Sectionalizer Tripped Switch 1—**This bit is set if any automatic control function has opened the switch. The bit is cleared when the switch is closed for any reason, and is also cleared on reinitialization of the Switch Control using the Setup software, or is cleared when you toggle the REMOTE/LOCAL switch.
14	**Sectionalizer Tripped Switch 2—**As above, for Switch 2. Otherwise off.
15	**Battery Maintenance Required—**On when battery replacement is required, unless the Switch Control is operating or has recently been operating on battery power. Otherwise off.
16	**Maintenance Required—**On when some form of maintenance (other than battery replacement) is required. It is set when the battery charger has failed due to over voltage, 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.
17	**Open/Close Indication Is Inconsistent Switch 1—**On when either both contacts are closed, or both contacts are open. Otherwise off.
18	**Open/Close Indication Is Inconsistent Switch 2—**On when either both contacts are closed, or both contacts are open. Otherwise off.
19	**Ac Control Power Failure—**This bit is set if ac control power is not available to the battery charger. It indicates that the Switch Control is operating on battery backup.

5802/3 STATUS POINTS—Continued	
Code #	**Name—Definition**
20	**Failure Override Set—**On when an operator has executed the *Failure Override Latch On* control command to let the switch be operated even if the battery is bad. The bit remains set until the override is disabled using the *Failure Override Latch Off* command. Also, the Status Point will go off, and Failure Override will become disabled after a 15-minute timeout, if it was not already turned off by the *Latch Off* command. Otherwise off.
21	**Battery System Low—**On when battery voltage is low, but the switch will operate. Otherwise off.
22	**Battery System Bad—**The battery voltage is too low to operate the switch. This condition blocks the operation of the switch unless the Failure Override bit is set. The "bad" battery status is only set when the battery voltage is definitely too low to operate the switch.
23	**Battery Charger Has Failed—**The charging voltage applied to the battery system was too high when the charger was connected, and the charger has been turned off.
24	**Battery Test in Progress—**The Switch Control automatically performs a test procedure on the batteries at periodic intervals. During the test, the battery voltage fluctuates.
25	**Cabinet Door Open—**On when the Switch Control 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.
26	**Temperature Sensor Bad—**The temperature sensor in the Switch Control is reading out of range. When the sensor is reading incorrectly, various temperature-related correction factors will not be accurate.
27	**Phase A Overcurrent Fault, Switch 1—**This bit is set if the peak current measured on Phase A has exceeded the programmed threshold level continuously for at least the programmed period of time. For a normally closed switch, the bit is cleared automatically once ac power has been restored to all phases, the switch is closed, and 45 minutes have elapsed or the faceplate REMOTE/LOCAL switch is toggled. For the normally open switch, you can toggle the REMOTE/LOCAL switch to clear the condition while the line switch is open or closed. **NOTE:** If the conditions above are met and you reinitialize the Switch Control using the Setup software or a SCADA operator command, the fault condition also clears.
28	**Phase B Overcurrent Fault, Switch 1—**As above for Phase B, Switch 1. Otherwise off.
29	**Phase C Overcurrent Fault, Switch 1—**As above for Phase C, Switch 1. Otherwise off.
30	**Overcurrent Ground Fault, Switch 1—**As above for ground, Switch 1. Otherwise off.
31	**Phase A Overcurrent Fault, Switch 2—**This bit is set if the peak current measured on Phase A has exceeded the programmed threshold level continuously for at least the programmed period of time. For a normally closed switch, the bit is cleared automatically once ac power has been restored to all phases, the switch is closed, and 45 minutes have elapsed or the faceplate REMOTE/LOCAL switch is toggled. For the normally open switch, you can toggle the REMOTE/LOCAL switch to clear the condition while the line switch is open or closed. **NOTE:** If the conditions above are met and you reinitialize the Switch Control using the Setup software or a SCADA operator command, the fault condition also clears.
32	**Phase B Overcurrent Fault, Switch 2—**As above for Phase B, Switch 2. Otherwise off.
33	**Phase C Overcurrent Fault, Switch 2—**As above for Phase C, Switch 2. Otherwise off.
34	**Overcurrent Ground Fault, Switch 2—**As above for ground, Switch 2. Otherwise off.
35	**Loss of Voltage on Any Configured Voltage Channel—**This point is set for any configured voltage channel where the voltage sensor shows a loss of voltage. For example, pad-mounted gear may be configured with three voltage sensors or six voltage sensors.

5802/3 STATUS POINTS—Continued	
Code #	**Name—Definition**
36	**Phase A Current Direction Switch 1—**This bit is set if the current on Phase A is flowing in the direction opposite to the "normal" direction configured in the Switch Control. The Switch Control identifies reverse current when the voltage-current phase angle deviates more than 90 degrees from the value set during installation for unity power factor.
37	**Phase B Current Direction Switch 1—**As above, for Phase B, Switch 1.
38	**Phase C Current Direction Switch 1—**As above, for Phase C, Switch 1.
39	**Phase A Current Direction Switch 2—**This bit is set if the current on Phase A is flowing in the direction opposite to the "normal" direction configured in the Switch Control. The Switch Control identifies reverse current when the voltage-current phase angle deviates more than 90 degrees from the value set during installation for unity power factor.
40	**Phase B Current Direction Switch 2—**As above, for Phase B, Switch 2.
41	**Phase C Current Direction Switch 2—**As above, for Phase C, Switch 2.
42	A**pplication Layer Confirmation Requests—**This bit is set when requests for application layer confirmations by the Switch Control are enabled. If enabled, the Switch Control requests a confirmation of receipt from the master station for every change event data response generated. If the Switch Control does not receive a confirmation within the "Time Delay Between Attempts," it issues another data response with request for confirmation. The "Number of Confirmation Attempts" setpoint determines the maximum number of times the Switch Control will reissue a request if it does not receive a confirmation.
43	**Data Link Layer Confirmation Requests—**Similar to the above, this bit is set when requests for data link layer confirmations by the Switch Control are enabled.
44	**Switch Control Not Transfer Ready—**Active only for the reporting Switch Control. This bit is set when a switch operation is not consistent with the expected team operation (i.e. incomplete or manual switch operation). This point is also active if: the switch is disabled (see Status Points 7 and 8), automatic operation is disabled (see Status Point 9), or the switch position is inconsistent (see Status Points 17 and 18). This point may be used in conjunction with the "Not All Teams Transfer Ready" Status Point 45 to identify the specific team member where a problem exists.
45	**Not All Teams Transfer Ready—**Active if any teams in which the Switch Control participates are not fully operational. This may be due to error conditions at individual team members (see Status Point 44), or team wide conditions such as isolation of a fault, team configuration errors, team coordination errors, automatic restoration prohibited (see Status Point 49), and team logic disabled on the TEAM:Setup screen. If Status Point 44 is set in one Switch Control of a team, this will cause Status Point 45 to be set in the other team members. **NOTE:** Unless otherwise prohibited, team member Switch Controls will revert to standalone sectionalizing logic when Not Transfer Ready is active in all teams that the control participates in, whether due to local conditions or conditions at adjacent team members.
46	**Automatic Transfer Operation in Progress—**True if any team defined in the control is actively performing an automatic transfer operation.
47	A**utomatic Return to Normal Operation in Progress—**True if any team defined in the control is actively performing a Return-To-Normal operation.
48	**Setup Data Revision—**True whenever the setup configuration data for any enabled team defined in the control is modified. It remains true until the Team Setup parameter on the SETUP: Team screen has been toggled from **Stopped** back to **Running** for any team where the setup data has been changed.

5802/3 STATUS POINTS—Continued	
Code #	**Name—Definition**
49	**Automatic Circuit Restoration Prohibited by SCADA—**This point will be set when this Switch Control has received the command to prohibit load restoration (see Control Point 11) from the SCADA master, or the feature has been enabled on the Prohibit Restoration screen in the Miscellaneous Operation menu. While this point is set no switch on any team in which this Switch Control participates will be allowed to automatically close, preventing automatic load restoration. This point will be cleared when the Prohibit Restoration feature is latched off with a command from the SCADA master (see Control Point 11), or disabled on the Prohibit Restoration screen in the Miscellaneous Operation menu.
50	**Automatic Circuit Restoration Prohibited by Team Timer—**This point will be set when a team transfer process timer has expired in this Switch Control, resulting in the Prohibit Restoration feature being enabled, for at least one of the teams in which this Switch Control participates. Only a team for which this timer has expired will be prohibited from further automatic load restoration. This point will be cleared when the Prohibit Restoration feature is latched off with a command from the SCADA master (see Control Point 11), or disabled on the Prohibit Restoration screen in the Miscellaneous Operation menu.
51	**Automatic Operation Enabled for Switch 1—**This point is only applicable when Status Point 9 is enabled.
52	**Automatic Operation Enabled for Switch 2—**This point is only applicable when Status Point 9 is enabled.
53	**Source Loading Data Is Active—**This point will be set when the real-time feeder loading logic is active and in use. This point does not indicate whether the control is using actual real-time feeder loading data received from a DNP master, or using the Default Source Segment Loading setting.
54	**Real-Time Load Data May Be Old or Abnormal—**This point is set when the DNP analog output value received is less than the real-time three-phase total load as sensed by the switch, and is also set if the real-time feeder loading data has not updated within the configured time interval. This point will be set to 0 if the real-time feeder loading logic is inactive (Status Point 53 = 0).
55	**Team 1 in Ready—**On when the Team is in the *Ready to Transfer* state. This point will be inactive if the Team is not in use, contains an error condition, or the line section represented by the Team contains a fault.
56	**Team 2 in Ready—**On when the Team is in the *Ready to Transfer* state. This point will be inactive if the Team is not in use, contains an error condition, or the line section represented by the Team contains a fault.
57	**Team 3 in Ready—**On when the Team is in the *Ready to Transfer* state. This point will be inactive if the Team is not in use, contains an error condition, or the line section represented by the Team contains a fault.
58	**Team 4 in Ready—**On when the Team is in the *Ready to Transfer* state. This point will be inactive if the Team is not in use, contains an error condition, or the line section represented by the Team contains a fault.
59	**Team 5 in Ready—**On when the Team is in the *Ready to Transfer* state. This point will be inactive if the Team is not in use, contains an error condition, or the line section represented by the Team contains a fault.
60	**Team 6 in Ready—**On when the Team is in the *Ready to Transfer* state. This point will be inactive if the Team is not in use, contains an error condition, or the line section represented by the Team contains a fault.
61	**Team 7 in Ready—**On when the Team is in the *Ready to Transfer* state. This point will be inactive if the Team is not in use, contains an error condition, or the line section represented by the Team contains a fault.
62	**Team 8 in Ready—**On when the Team is in the *Ready to Transfer* state. This point will be inactive if the Team is not in use, contains an error condition, or the line section represented by the Team contains a fault.

5802/3 ANALOG INPUT POINTS	
Code #	**Name—Definition**
0	**90% Voltage Reference Standard—**A constant, required by protocol implementation to conform to the RTU standard.
1	**0% Voltage Reference Standard—**A constant, with a value of zero, required by protocol implementation to conform to the RTU standard.
2	**Neutral Current Switch 1**—Taken as the vector sum of the phase currents on Phases A, B, and C. Current is measured using true RMS techniques and reported in units of one count equals one ampere.
3	**Current Phase A Switch 1—**Single-phase true RMS current measured on Phase A. Each count equals one ampere.
4	**Current Phase B Switch 1—**Single-phase true RMS current measured on Phase B. Each count equals one ampere.
5	**Current Phase C Switch 1—**Single-phase true RMS current measured on Phase C. Each count equals one ampere.
6	**Neutral Current Switch 2**—Taken as the vector sum of the phase currents on Phases A, B, and C. Current is measured using true RMS techniques and reported in units of one count equals one ampere.
7	**Current Phase A Switch 2—**Single-phase true RMS current measured on Phase A. Each count equals one ampere.
8	**Current Phase B Switch 2—**Single-phase true RMS current measured on Phase B. Each count equals one ampere.
9	**Current Phase C Switch 2—**Single-phase true RMS current measured on Phase C. Each count equals one ampere.
10	**Neutral Current Switch 3**—Taken as the vector sum of the phase currents on Phases A, B, and C. Current is measured using true RMS techniques and reported in units of one count equals one ampere.
11	**Current Phase A Switch 3—**Single-phase true RMS current measured on Phase A. Each count equals one ampere.
12	**Current Phase B Switch 3—**Single-phase true RMS current measured on Phase B. Each count equals one ampere.
13	**Current Phase C Switch 3—**Single-phase true RMS current measured on Phase C. Each count equals one ampere.
14	**Voltage Phase A Switch 1—**Single-phase voltage measured on Phase A of Switch 1. Voltage is measured using true RMS techniques and scaled to yield a nominal value of 120 Vac. Configuration of the Switch Control at installation provides the scaling factors such as voltage transformer turn ratio, etc. In cases where loads are connected in a delta (phase-to-phase) configuration, the Switch Control sensor conditioning module is jumpered to yield phase-to-phase voltage readings. Voltage is reported in units of one sensor count equals 0.1 Vac RMS.
15	**Voltage Phase B Switch 1—**Phase-to-ground or phase-to-phase voltage (depending on setup) measured on Pole B, Switch 1. Each count equals 0.1 Vac RMS.
16	**Voltage Phase C Switch 1—**Phase-to-ground or phase-to-phase voltage (depending on setup) measured on Pole C, Switch 1. Each count equals 0.1 Vac RMS.
17	**Voltage Phase A Switch 2—**Phase-to-ground or phase-to-phase voltage (depending on setup) measured on Pole A, Switch 2. Each count equals 0.1 Vac RMS.
18	**Voltage Phase B Switch 2—**Phase-to-ground or phase-to-phase voltage (depending on setup) measured on Pole B, Switch 2. Each count equals 0.1 Vac RMS.

5802/3 ANALOG INPUT POINTS—Continued	
Code #	**Name—Definition**
19	**Voltage, Phase C Switch 2—**Phase-to-ground or phase-to-phase voltage (depending on setup) measured on Pole C, Switch 3. Each count equals 0.1 Vac RMS.
20	**Phase Angle on Phase A Switch 1—**Each count equals one-eighth degree.
21	**Phase Angle on Phase B Switch 1—**Each count equals one-eighth degree.
22	**Phase Angle on Phase C Switch 1—**Each count equals one-eighth degree.
23	**Phase Angle on Phase A Switch 2—**Each count equals one-eighth degree.
24	**Phase Angle on Phase B Switch 2—**Each count equals one-eighth degree.
25	**Phase Angle on Phase C Switch 2—**Each count equals one-eighth degree.
26	**Single-Phase kVARs, Phase A Switch 1—**kVARs (volt-amperes, reactive) are calculated from single-phase true RMS voltage and current sensor values and the respective voltage-current phase angle. Each count equals one kVAR.
27	**Single-Phase kVARs, Phase B Switch 1—**As above.
28	**Single-Phase kVARs, Phase C Switch 1—**As above.
29	**Single-Phase kVARs, Phase A Switch 2—**As above.
30	**Single-Phase kVARs, Phase B Switch 2—**As above.
31	**Single-Phase kVARs, Phase C Switch 2—**As above.
32	**Cabinet Temperature**—In units of °F.
33	**Battery Voltage**—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.
34	**Three-Phase Sum of kVARs Switch 1—**Sum of A, B, & C phase kVARs for Switch 2. Each count equals one kVAR.
35	**Three-Phase Sum of kVARs Switch 2—**Sum of A, B, & C phase kVARs for Switch 1. Each count equals one kVAR.
36	**Three-Phase Sum of kW Switch 1—**Sum of A, B, & C phase kW for Switch 1. Each count equals one kW.
37	**Three-Phase Sum of kW Switch 2—**Sum of A, B, & C phase kW for Switch 2. Each count equals one kW.
38	**Three-Phase Sum of kVA Switch 1—**Sum of A, B, & C phase kVA for Switch 1. Each count equals one kVA.
39	**Three-Phase Sum of kVA Switch 2—**Sum of A, B, & C phase kVA for Switch 2. Each count equals one kVA.

5802/3 ANALOG OUTPUT POINTS	
Point #	**Name—Definition**
0	**Application Layer Confirmation Retry Time—**This is the length of time the Switch Control waits for an application layer confirmation on a response message before resending the response. It uses "timer byte format." The retry time is only in effect when the confirmation process is enabled. **NOTE:** In "timer byte format," the top two bits are the time units (0 = tenths of seconds, 1 ($40) = seconds, 2 ($80) = minutes, 3 ($C0) = hours). The bottom 6 bits are the count. A value of 1 second ($41) can be more accurately specified as 10 tenths ($0A). A value of 1 minute ($81) can be specified as 60 seconds ($7C). A value of 1 hour ($C1) can be specified as 60 minutes ($BC). The value $FF generates an "infinite" time value.
1	**Application Layer Confirmation Retry Count—**Number of times (0 to 10) the Switch Control 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.
2	**Control Point Select Time—**During a Select-Before-Operate procedure, this is the length of time that may elapse between receiving the Select function for a point and receiving the Operate function for that same point. If an Operate is not received within this time period, the point is deselected and another Select is required before the point will operate. It uses "timer byte format."
3	**Real-Time Feeder Loading—**A DNP device with real-time feeder loading data can use this analog output point to inform the Switch Controls in a team of the total averaged three-phase feeder loading measured at the breaker in amps. The team(s) can then use this real-time loading data to determine more accurately whether transferring load can be accomplished safely. Each count equals one ampere.

5802/3 BINARY COUNTER POINTS	
Point #	**Name—Definition**
0	**Operation Counter Switch 1—**This is the number of switch operations. The counter is incremented on each Close operation. This is a 16-bit counter and will overflow back to zero at 65,535.
1	**Operation Counter Switch 2—**This is the number of switch operations. The counter is incremented on each Close operation. This is a 16-bit counter and will overflow back to zero at 65,535.
2	**Operation Counter Switch 3—**This is the number of switch operations. The counter is incremented on each Close operation. This is a 16-bit counter and will overflow back to zero at 65,535.

5802/3 FROZEN COUNTER POINTS	
Point#	**Name—Definition**
0	**Frozen Operation Counter Switch 1—**This is the number of switch operations before the operation counter received a Freeze command.
1	**Frozen Operation Counter Switch 2—**This is the number of switch operations before the operation counter received a Freeze command.
2	**Frozen Operation Counter Switch 3—**This is the number of switch operations before the operation counter received a Freeze command.

5802/3 CONTROL POINTS	
Code #	**Name—Definition**
0	**Open or Close Switch 1, SCADA—**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.
1	**Open or Close Switch 2, SCADA—**As above, for Switch 2.
2	**Open or Close Switch 3, SCADA—**As above, for Switch 3.
3	**Issue the Shots-to-Lockout Command to Switch 1—**This command may be issued using either the Select/Operate sequence, the Direct Operate function, or the Direct Operate without Ack function. Only a Close command is valid for this point. This command is ignored and returns an error if the switch is not open, or automatic operation is not enabled.
4	**Issue the Shots-to-Lockout Command to Switch 2—**This command may be issued using either the Select/Operate sequence, the Direct Operate function, or the Direct Operate without Ack function. Only a Close command is valid for this point. This command is ignored and returns an error if the switch is not open, or automatic operation is not enabled. **NOTE (Points 0–4):** These commands are ignored and return an error if a bad battery condition is active and the Failure Override command has not been issued, or if the external local/remote switch in the motor operator cabinet associated with the intended position is set to local. These commands are ignored if the **REMOTE/LOCAL** switch is not in the **REMOTE** position.
5	**Reset (clear) Any Outstanding Overcurrent Fault Conditions Present—**This command must be issued using a Pulse On request. The fault condition otherwise remains active for 45 minutes after the switch is closed and ac power is fully restored, or until the **REMOTE/LOCAL** switch is toggled.
6	**Begin a Battery Test Cycle—**This command must be issued using a Pulse On request. If ac power is on, the charger is disconnected for several minutes while the test is in progress. If ac power is off, a brief battery impedance test evaluates the battery condition.
7	**Enable/Disable Failure Override Status—**This command must be issued using the Latch On/Off request in the control relay output block. This allows Open and Close commands to be processed even if the switch *Not Ready* condition is active.
8	**Enable/Disable Automatic Operation—**This command must be issued using the Latch On/Off request in the control relay output block. In Automatic mode, the Switch Control automatically opens the switch if a preconfigured recloser sequence is recognized after a detected fault. **NOTE:** Automatic operation is not disabled when the faceplate **REMOTE/LOCAL** switch is set to **LOCAL** operation.
9	**Enable/Disable Application Layer Confirmations—**This command must be issued using the Latch On/Off request in the control relay output block. When enabled, the Switch Control requests a confirmation from the master station for every response message generated.
10	**Enable/Disable Data Link Layer Confirmations—**This command must be issued using the Latch On/Off request in the control relay output block. When enabled, the Switch Control uses “confirmed user data” packets for all messages originated by the Switch Control.
11	**Prohibit Automatic Circuit Restoration—**This command must be issued using the Latch On/Off request in the control relay output block. When latched this command will prevent the local switch, and any switches in any team in which this Switch Control participates, from automatically closing to restore load under any circumstances.

6802/3 CONTROL POINTS—Continued	
Code #	**Name—Definition**
12	**Enable/Disable Automatic Operation for Switch 1—**This command must be issued using the Latch On/Off request in the control relay output block. **NOTE:** To operate Control Point 12 or 13 the REMOTE/LOCAL switch on the faceplate must be in the **REMOTE** position, and Control Point 8 must be set via SCADA to Enable. Switch 1 and Switch 2 Automatic Operation status can be confirmed with Status Points 51 and 52. If the faceplate switches are used to select **LOCAL** Operation and **DISABLED** global Automatic Operation, Control Points 12 and 13 will take effect again when the faceplate switches are set to **REMOTE** Operation and **ENABLED** global Automatic Operation.
13	**Enable/Disable Automatic Operation for Switch 2—**As above, for Switch 2.

DNP Implementation

This implementation of DNP and this section of documentation conform to the document DNP V3.00 *Subset Definitions*, Version 0.01, available from the DNP Users Group.

Device Profile Description

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

<table>
<tr><td colspan="2">DNP V3.00
DEVICE PROFILE DOCUMENT</td></tr>
<tr><td colspan="2">Vendor Name: S&C Electric Company</td></tr>
<tr><td colspan="2">Device Name: S&C 5800 Series IntelliTeam® II</td></tr>
<tr><td>Highest DNP Level Supported:
For Requests - Level 2
For Responses - Level 2</td><td>Device Function:
___ Master X Slave</td></tr>
<tr><td colspan="2">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_____
_____
_____
_____
_____</td></tr>
<tr><td>Maximum Data Link Frame Size (bytes)
Transmitted - 292
Received - 292</td><td>Max Application Fragment Size (bytes)
Transmitted - 249
Received - 249</td></tr>
<tr><td>Maximum Data link Re-tries:
X None
__ Fixed at _____
__ Configurable, range 1 to 25</td><td>Maximum Application Layer Re-tries:
__ None
__ Fixed at _____
X Configurable, range 1 to 25
and infinite</td></tr>
<tr><td colspan="2">Requires Data Link Layer Confirmation:
X Never
__ Always
__ Sometimes If 'Sometimes', when?
__ Configurable If 'Configurable', how?</td></tr>
</table>

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?
X_ Configurable If 'Configurable', how? - Response confirmations are configured through SCADA communications or through locally connected setup software.

Timeouts while waiting for:

Data Link Confirm	X	None	__	Fixed	__	Variable	__	Config
Complete Appl. Fragment	X	None	__	Fixed	__	Variable	__	Config
Application Confirm	__	None	__	Fixed	__	Variable	X	Config
Complete Appl. Response	X	None	__	Fixed	__	Variable	__	Config

Others _____

Attach explanation if 'Variable' or 'Configurable' was checked
(see Note 1 below for explanation)

Sends/Executes Control Operations:

WRITE Binary Outputs	X	Never	__	Always	__	Sometimes	__	Config
SELECT/OPERATE	__	Never	__	Always	X	Sometimes	__	Config
DIRECT OPERATE	__	Never	__	Always	X	Sometimes	__	Config
DIRECT OPERATE - NO ACK	__	Never	__	Always	X	Sometimes	__	Config
Count > 1	X	Never	__	Always	__	Sometimes	__	Config
Pulse On	__	Never	__	Always	X	Sometimes	__	Config
Pulse Off	X	Never	__	Always	__	Sometimes	__	Config
Latch On	__	Never	__	Always	X	Sometimes	__	Config
Latch Off	__	Never	__	Always	X	Sometimes	__	Config
Queue	X	Never	__	Always	__	Sometimes	__	Config
Clear Queue	X	Never	__	Always	__	Sometimes	__	Config

Attach explanation if 'Sometimes' or 'Configurable' was checked
(see Note 2 below for explanation)

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

NOTE 1: Timeouts While Waiting for Confirmations

When an application layer response confirmation is requested, the Switch Control 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 Attempts* with the Setup software or via SCADA. (See the *Setup* instructions 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 Control 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 Control 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 Control 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 Control 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).

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 Control 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
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 (object parsed but no data to return)	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	04	04
No Object			13		
No Object			23		

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 Control returns a status byte for each Control Point available. In this implementation of the Binary Output Status object, only the On-Line 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: 8-Bit Unsigned Integer

This object provides efficient access to all types of memory-mapped data. All virtual memory locations are addressed using 16-bit absolute address identifiers in the Range field (qualifier code 4), least significant byte (LSB) first.

NOTE: Switch Controls with IntelliTeam II primarily use this object to share specific records or data with each other. It is available for SCADA implementation, but is not required.

NOTE 6: Polling Class

DNP points are assigned to polling classes. S&C Automatic Controls implement only Class 0 and Class 1 polls. The Class 0 poll contains all DNP points for the control that return **static data**, the latest value for all data. The Class 1 poll returns **event data**, any DNP point that has changed since the last event data message was received. Polling frequency is an aspect of the user's SCADA system, and is user selectable.

The Class 2 and 3 polls are user defined lists of DNP points that will be returned when the IED receives a Class 2 or 3 poll. S&C Automatic Controls do not support Class 2 or 3 polling. When received, the Class 2 or 3 poll request is understood, it does not elicit an error response, and the response is just the application header with no objects. The SCADA master station can send a Class 2 or 3 poll to other equipment on the system, and S&C Controls will not return an error.

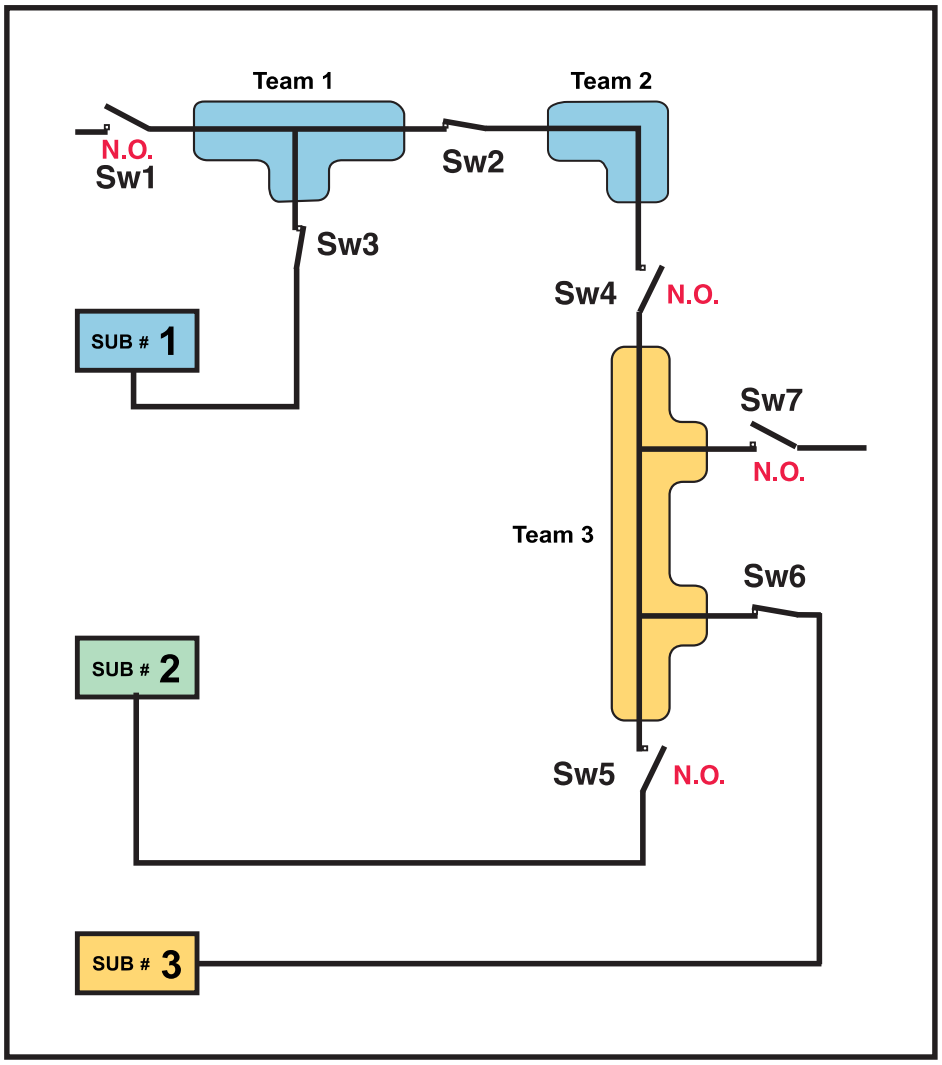

Figure 1. Transfer Ready Status Point illustration.

Table 1. Transfer Ready Status Point Illustration

Issue DO 5 (Disable Automatic Operation) to Control 4							
DI Point	Sw 1	Sw 2	Sw 3	Sw 4	Sw 5	Sw 6	Sw 7
3	1	1	1	0	1	1	1
29	0	0	0	1	0	0	0
30	0	1	0	1	1	1	1
34	0	0	0	0	0	0	0

Issue DO 5 (Disable Automatic Operation) to Control 3							
DI Point	Sw 1	Sw 2	Sw 3	Sw 4	Sw 5	Sw 6	Sw 7
3	1	1	0	1	1	1	1
29	0	0	1	0	0	0	0
30	1	1	1	0	0	0	0
34	0	0	0	0	0	0	0

Issue DO 8 (Prohibit Restoration) to Control 4							
DI Point	Sw 1	Sw 2	Sw 3	Sw 4	Sw 5	Sw 6	Sw 7
3	1	1	1	1	1	1	1
29	0	0	0	0	0	0	0
30	0	1	0	1	1	1	1
34	0	0	0	1	0	0	0

Battery Bad on Control 4							
DI Point	Sw 1	Sw 2	Sw 3	Sw 4	Sw 5	Sw 6	Sw 7
2	0	0	0	1	0	0	0
3	1	1	1	1	1	1	1
14	0	0	0	1	0	0	0
29	0	0	0	1	0	0	0
30	0	1	0	1	1	1	1
34	0	0	0	0	0	0	0

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