

DNP Points List and Implementation

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This instruction sheet provides Distributed Network Protocol (DNP) points and DNP implementation information for the TripSaver II Communications Gateway.

This instruction sheet is used with gateway firmware release 3.0. Other related software component version information is found on the *General Status* screen of the gateway Web user interface.

The DNP master station should define the TripSaver II Communications Gateway with the following **Status**, **Analog Input**, **Counter**, and **Control** points:

Point	Count
Status (Binary Input)	63
Analog Input	11
Counter	5
Control	7
Group 0	6

The available DNP points are listed in Tables 1 through 5 on pages 2 through 9 in the same order they are presented for selection on the *DNP3 Outstation Settings* screen of the gateway Web user interface. TripSaver II recloser **Status**, **Analog Input**, **Control**, and **Counter** points can be assigned to any SCADA DNP point index. The code numbers for each point description are listed in Instruction Sheet 461-560 (this publication) and are not the SCADA point index.

The TripSaver II Communications Gateway supports **Concentrator** mode, which allows users to assign up to four TripSaver II reclosers and one communication gateway to a single DNP slave address.

Each DNP input point can be assigned to a specific event class (0,1,2,3) to allow differentiated polling via the DNP3 protocol. In addition, all analog inputs and counters can be assigned deadband ranges to enable deadband reporting.

For a specific SCADA system, typically all TripSaver II Communications Gateways operate with the same DNP point-index configuration.

Unless otherwise noted, each point is in an **On** state if the condition is logically true or active.

Table 1. Status (Binary Input) Points

Device	Code # - Concentrator mode	Name—Definition
Gateway	1	Communication gateway running on primary ac power —On when ac power is being supplied to gateway; otherwise, off.
Gateway	2	Communication gateway running on backup battery power —On when gateway is being powered by backup battery; otherwise, off.
Gateway	3	Communication gateway is online —On when gateway is online; otherwise, off.
Gateway	4	Communication gateway door is open —On when external door is open; off when closed.
Gateway	5	Communication gateway battery is present —On when the gateway's optional battery is installed; off when battery is not present.
Gateway	6	Communication gateway backup battery requires replacement —On when battery has reached end of life; off when battery is operating normally.
Gateway	7	Communication gateway established GPS synchronization —On when gateway successfully synchronizes with GPS for time and location; off when gateway has yet to synchronize with GPS or loses sync.
Gateway	8	Communication gateway remote Web-user interface access enable —On when the gateway's Web-user interface can be accessed via the gateway's WAN Ethernet interface (port #2). This requires two settings to be enabled. The first is control (binary output) point code #1. The second is a local gateway setting that cannot be updated remotely. Off when either of those settings are disabled and, therefore, the gateway's Web-user interface cannot be accessed via the gateway's WAN Ethernet port.
Gateway	9	Communication gateway remote Web-user interface access switch enabled via SCADA —On when control point 1 has been enabled to allow remote access to the gateway's Web-user interface; off when control point 1 is disabled.
Gateway	10	Communication gateway Web-user interface is being accessed —On when a user is successfully logged in to the gateway's Web-user interface; off when the user logs out.
Gateway	11	Communication gateway Web-user interface authentication rejected —On when the user attempts to log in to gateway Web-user interface and does not pass authentication; off when the user logs in successfully or after 5 minutes to clear the event.
Gateway	12	Communication gateway configuration changed via Web-user interface —On when the user changes a configuration parameter directly via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	13	Communication gateway configuration file imported —On when the user imports a configuration file via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	14	Communication gateway configuration file exported —On when the user exports a configuration file via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	15	Communication gateway secure tunnel added —On when the user adds a secure tunnel via the gateway's Web-user interface; off after 5 minutes to clear the event.

TABLE CONTINUED ►

Status Points

Table 1. Status (Binary Input) Points—continued

Device	Code # - Concentrator mode	Name—Definition
Gateway	16	Communication gateway secure tunnel changed —On when the user changes a secure tunnel via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	17	Communication gateway secure tunnel removed —On when the user removes a secure tunnel via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	18	Communication gateway firmware upgrade success —On when the Web-user interface user attempts and successfully installs a firmware upgrade; off after 5 minutes to clear the event.
Gateway	19	Communication gateway firmware upgrade rejected —On when the Web-user interface user attempts to install a firmware upgrade but the gateway rejects it as an invalid firmware image; off when the gateway accepts a valid firmware image or after 5 minutes to clear the event.
Gateway	20	Communication gateway user account added —On when the administrative user adds a new user account via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	21	Communication gateway user account removed —On when the administrative user removes a user account via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	22	Communication gateway user account password changed —On when the administrative user changes the password for a user account via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	23	Communication gateway TripSaver II recloser added —On when a new TripSaver II recloser is added via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	24	Communication gateway TripSaver II recloser removed —On when a TripSaver II recloser is removed via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	25	Communication gateway diagnostic log retrieved —On when diagnostic logs are retrieved via the gateway's Web-user interface; off after 5 minutes to clear the event.
Gateway	26	Communication gateway reboot initiated via Web-user interface —On when the Web user triggers a reboot of the gateway. The point will go offline as the gateway reboots and will go to the Off setting after the reboot completes.
Gateway	27	Communication gateway gang operation initiated via Web-user interface —On when the Web user initiates a gang operation; off after 5 minutes to clear the event.
Gateway	28	Communication gateway gang operation cancelled via Web-user interface —On when the Web user cancels a gang operation; off after 5 minutes to clear the event.
Gateway	29	Communication gateway Remote Gang Drop Open operation in progress —On when the operation is in progress; off after all reclosers in the gang have dropped open, when retries have been exhausted, or when the Web user cancels the drop-open retries by either clicking on the Cancel button or placing the dropped open recloser back into the cutout mounting.

TABLE CONTINUED ►

Table 1. Status (Binary Input) Points—continued

Device	Code # - Concentrator mode	Name—Definition
Gateway	30	Communication Test —Reflects the state from Communication Test output point 4. The initial state on power up is off. Each time the Communication Test command is received, this binary input is toggled.
TripSaver II recloser	1001-TS#1 2001-TS#2 3001-TS#3 4001-TS#4	TripSaver II recloser connection to the gateway has been lost —On when the connection to the gateway has been lost for at least 5 minutes; off when TripSaver II recloser connection is re-established.
TripSaver II recloser	1002, 2002, 3002, 4002	TripSaver II recloser connected to the service center configuration (SCC) software via the gateway —On when the SCC software tool is being used to manage the TripSaver II recloser via the gateway; off when the SCC software session completes.
TripSaver II recloser	1003, 2003, 3003, 4003	TripSaver II recloser vacuum interrupter is open —On when the TripSaver II recloser has opened its vacuum interrupter; otherwise, off.
TripSaver II recloser	1004, 2004, 3004, 4004	TripSaver II recloser vacuum interrupter is closed —On when the TripSaver II recloser's vacuum interrupter is closed; otherwise, off.
TripSaver II recloser	1005, 2005, 3005, 4005	TripSaver II recloser dropped open due to fault current event —On when the TripSaver II recloser has physically dropped open in response to a fault; off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1006, 2006, 3006, 4006	TripSaver II recloser dropped open because of a sectionalizing event —On when the TripSaver II recloser has physically dropped open because of a sectionalizing event; off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1007, 2007, 3007, 4007	TripSaver II recloser dropped open because of an overload event —On when the TripSaver II recloser has physically dropped open because of an overload event; off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1008, 2008, 3008, 4008	TripSaver II recloser had an overcurrent trip event —On when the TripSaver II recloser detects an overcurrent trip event; off when the TripSaver II recloser clears a temporary fault or when the TripSaver II recloser is brought back online (status point code x017) following a drop open.
TripSaver II recloser	1009, 2009, 3009, 4009	TripSaver II recloser needs to be serviced now —On when the TripSaver II recloser has entered the Service Now state and requires immediate attention.
TripSaver II recloser	1010, 2010, 3010, 4010	TripSaver II recloser needs to be serviced soon —On when the TripSaver II recloser's vacuum interrupter has 10% of its remaining contact wear.
TripSaver II recloser	1011, 2011, 3011, 4011	TripSaver II recloser currently in Auto mode —On when the TripSaver II recloser is in Auto (Reclosing) mode; off when the TripSaver II recloser is in the NR (non-reclosing) mode. (This point code is derived from status point codes x012, x013, and x014.)
TripSaver II recloser	1012, 2012, 3012, 4012	TripSaver II recloser lever in the Auto position —On when the MODE-SELECTOR lever is in the Auto (up) position. Off when the MODE-SELECTOR lever is in the NR (down) position.
TripSaver II recloser	1013, 2013, 3013, 4013	TripSaver II recloser Remote-NR mode enabled —On when the TripSaver II recloser's Remote NR setting is enabled; off when disabled.

TABLE CONTINUED ►

Status Points

Table 1. Status (Binary Input) Points—continued

Device	Code # - Concentrator mode	Name—Definition
TripSaver II recloser	1014, 2014, 3014, 4014	TripSaver II recloser is temporarily in Auto mode after a manual reclose — On when the TripSaver II recloser is temporarily running in Auto mode after a manual reclose before returning to Remote NR mode; off when the TripSaver II recloser transitions back to Remote NR mode after 5 minutes. (For more details on this temporary mode, please refer to S&C Instruction Sheet 461-502.)
TripSaver II recloser	1015, 2015, 3015, 4015	TripSaver II recloser attempted to drop open but did not —On when the TripSaver II recloser attempted to drop open but didn't (e.g. cutout icing situation or path blocked by foreign object). Off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1016, 2016, 3016, 4016	TripSaver II recloser swung to horizontal position with the vacuum interrupter closed —On when the TripSaver II recloser unexpectedly shifted to a horizontal position while the vacuum interrupter remained closed; off when TripSaver II recloser restored to proper orientation.
TripSaver II recloser	1017, 2017, 3017, 4017	TripSaver II recloser is online —On when TripSaver II recloser is powered up and communicating with the communication gateway; otherwise, off.
TripSaver II recloser	1018, 2018, 3018, 4018	TripSaver II recloser powering down because of a lack of load current —On when the TripSaver II recloser is in the process of powering down because of a lack of available load current; off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1019, 2019, 3019, 4019	TripSaver II recloser battery is out of service —On when recloser battery is out of service; off when recloser battery is operating normally.
TripSaver II recloser	1020, 2020, 3020, 4020	TripSaver II recloser user triggered a successful Local Manual Open operation —On when a local user triggers the Local Manual Open (LMO) feature to force the TripSaver II recloser to drop open; off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1021, 2021, 3021, 4021	TripSaver II recloser detected a suspicious attempt to trigger a Local Manual Open operation —On when a local user attempts to trigger the Local Manual Open (LMO) feature but the feature is not enabled; off after 5 minutes to clear the event.
TripSaver II recloser	1022, 2022, 3022, 4022	TripSaver II recloser gateway Local Drop Open control enabled —On when the TripSaver II recloser's gateway local drop-open capability is enabled; off when disabled.
TripSaver II recloser	1023, 2023, 3023, 4023	TripSaver II recloser dropped open because of a Drop Open command —On when the TripSaver II recloser has physically dropped open because of an accepted gateway requested drop open command; off when the TripSaver II recloser is online (Status Point Code x017).
TripSaver II recloser	1024, 2024, 3024, 4024	TripSaver II recloser rejected a Drop Open command because of insufficient energy —On when the TripSaver II recloser rejected a request from the gateway to perform a Drop Open function because of insufficient stored energy to execute the Drop Open sequence; off when TripSaver II recloser successfully drops open (status point code x023) or a Gang Operation sequence completes.
TripSaver II recloser	1025, 2025, 3025, 4025	TripSaver II recloser rejected a Drop Open command because of excessive line current —On when the TripSaver II recloser rejected a request from the gateway to perform a Drop Open function because of a current level that exceeds the TripSaver II recloser's rated interruption capability; off when TripSaver II recloser successfully drops open (status point code x023) or a Gang Operation sequence completes.

TABLE CONTINUED ►

Table 1. Status (Binary Input) Points—continued

Device	Code # - Concentrator mode	Name—Definition
TripSaver II recloser	1026, 2026, 3026, 4026	TripSaver II recloser rejected a Drop Open command because of configuration —On when the TripSaver II recloser rejected a request from the gateway to perform a Drop Open function because the gateway Drop Open Control Enable setting is disabled (status point code x022); off when a Gang Operation sequence completes.
TripSaver II recloser	1028, 2028, 3028, 4028	TripSaver II recloser attempted to drop open because of a Drop Open command but did not —On when the TripSaver II recloser attempted to drop open because of a Drop Open command from the gateway but didn't (e.g. cutout icing situation or path blocked by foreign object). This is an error condition; off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1029, 2029, 3029, 4029	TripSaver II recloser dropped open because of a fault-current event while operating with standard NR TCC curve —On when the TripSaver II recloser has physically dropped open in response to a fault while operating with the standard NR TCC curve; off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1030, 2030, 3030, 4030	TripSaver II recloser dropped open because of a fault-current event while operating with cold wakeup NR TCC curve —On when the TripSaver II recloser has physically dropped open in response to a fault while operating with the cold wakeup NR TCC curve; off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1031, 2031, 3031, 4031	TripSaver II recloser dropped open because of a fault-current event while operating with post-fault wakeup NR TCC curve —On when the TripSaver II recloser has physically dropped open in response to a fault while operating with the post-fault wakeup NR TCC curve; off when the TripSaver II recloser is online (status point code x017).
TripSaver II recloser	1032, 2032, 3032, 4032	TripSaver II recloser single unit Remote Drop Open operation in progress —On when the procedure is in progress; off after the TripSaver II recloser has dropped open, when retries have been exhausted, or when the Web-user cancels the gang operation retries by either clicking on the Cancel button or placing the dropped open recloser back into the cutout mounting.
TripSaver II recloser	1033, 2033, 3033, 4033	TripSaver II recloser sequence coordination protection is active —On when the TripSaver II recloser has entered the Sequence Coordination state; off after the TripSaver II recloser has exited the Sequence Coordination state and has returned to an existing protection curve.
TripSaver II recloser	1034, 2034, 3034, 4034	TripSaver II recloser in horizontal position —On when the TripSaver II recloser is in the horizontal position (dropped open), for any reason; off when the TripSaver II recloser is in the vertical position (closed in).

Analog Input Points

Table 2. Analog Input Points

Device	Code # - Concentrator mode	Name—Definition
Gateway	1	Communication gateway battery voltage —Nominally 12 Vdc; one count equals 0.01 Vdc.
TripSaver II recloser	1001-TS#1 2001-TS#2 3001-TS#3 4001-TS#4	Communication gateway 802.15.4 received signal strength from TripSaver II recloser —The received signal strength for transmissions from a specific TripSaver II recloser on the gateway's 802.15.4 network interface; signed value with unit 1 dBm, for example -63 dBm. Note: -63 dBm is better than -90 dBm.
TripSaver II recloser	1002, 2002, 3002, 4002	TripSaver II recloser real time load current —Single-phase load current; each count equals one ampere.
TripSaver II recloser	1003, 2003, 3003, 4003	TripSaver II recloser fault current magnitude —Current at time of trip for the last overcurrent event detected; each count equals 1 ampere.
TripSaver II recloser	1004, 2004, 3004, 4004	TripSaver II recloser battery voltage —Nominally 3.9 Vdc; one count equals 0.01 Vdc.
TripSaver II recloser	1005, 2005, 3005, 4005	TripSaver II recloser 802.15.4 received signal strength —The received signal strength on the TripSaver II recloser's 802.15.4 network interface; signed value with unit 1 dBm, for example -63 dBm.
TripSaver II recloser	1006, 2006, 3006, 4006	TripSaver II recloser number of times vacuum interrupter opened —The number of times the TripSaver II recloser's vacuum interrupter opened.
TripSaver II recloser	1007, 2007, 3007, 4007	TripSaver II recloser number of times dropped open —The number of times the TripSaver II recloser dropped open.
TripSaver II recloser	1008, 2008, 3008, 4008	TripSaver II recloser number of times dropped open because of a gateway command —The number of times the TripSaver II recloser successfully dropped open because of a gateway Drop Open command.
TripSaver II recloser	1009, 2009, 3009, 4009	TripSaver II recloser number of times gateway Drop Open command was rejected because of the configuration —The number of times the TripSaver II recloser rejected a gateway Drop Open command because of the configuration. (Can be triggered by either a Local Drop Open event or a Remote Drop Open event.)
TripSaver II recloser	1010, 2010, 3010, 4010	TripSaver II recloser number of times gateway Drop Open command was unsuccessful for other reasons —The number of times a gateway Drop Open command to the TripSaver II recloser was unsuccessful for other reasons (e.g. attempted to drop open but failed, insufficient energy, or excessive line current). This could be incremented multiple times during a single Drop Open process caused by retries from the gateway.

Table 3. Counter Points

Device	Code # - Concentrator mode	Name—Definition
TripSaver II recloser	1001-TS#1 2001-TS#2 3001-TS#3 4001-TS#4	TripSaver II recloser number of times vacuum interrupter opened —The number of times the TripSaver II recloser's vacuum interrupter opened.
TripSaver II recloser	1002, 2002, 3002, 4002	TripSaver II recloser number of times dropped open —The number of times the TripSaver II recloser dropped open.
TripSaver II recloser	1003, 2003, 3003, 4003	TripSaver II recloser number of times dropped open because of a gateway command —The number of times the TripSaver II recloser successfully dropped open because of a gateway Drop Open command.
TripSaver II recloser	1004, 2004, 3004, 4004	TripSaver II recloser number of times gateway Drop Open command was rejected because of configuration —The number of times the TripSaver II recloser rejected a gateway Drop Open command because of a configuration. (Could be triggered by either a Local Drop Open event or a Remote Drop Open event.)
TripSaver II recloser	1005, 2005, 3005, 4005	TripSaver II recloser number of times gateway Drop Open command was unsuccessful for other reasons —The number of times a gateway Drop Open command to the TripSaver II recloser was unsuccessful for other reasons (e.g. attempted to drop open but failed, insufficient energy, or excessive line current). This could be incremented multiple times during a single Drop Open process because of retries from the gateway.

Control Points

Table 4. Control Points

Device	Code # - Concentrator mode	Name—Definition
Gateway	1	Communication gateway remote Web-user interface switch —This controls the accessibility of the gateway's Web-user interface. A Latch On value enables remote access via Ethernet port #2 and sets status point 9 active. A Latch Off value disables remote access via Ethernet port #2 and sets status point 9 inactive.
Gateway	2	Communication gateway remote Gang Drop Open command —This triggers the remote initiation of a Gang Drop Open procedure. Initiation is a Close Pulse On value and is the equivalent of a momentary close.
Gateway	3	Remote NR mode ALL switch —This controls the Auto mode of all TripSaver II reclosers provisioned in the gateway with a single transaction. Each TripSaver II recloser is updated independently. The Latch On value disables Auto mode and sets status point x013 as active. The Latch Off value enables the Auto mode and sets the status point x013 as being inactive. If there is a timing conflict between this point and control point x001, the most recently received command will have precedence.
Gateway	4	Communication Test —This command toggles the state of the Communication Test status point 30 each time this command is received.
TripSaver II recloser	1001-TS#1 2001-TS#2 3001-TS#3 4001-TS#4	Remote NR mode switch —This controls the Auto mode of the TripSaver II recloser. The Latch On value disables Auto mode and sets status point x013 as active. The Latch Off value enables the Auto mode and sets the status point x013 as being inactive. The default is the Latch Off value, which sets the Remote Non-Reclosing mode to “Off.” If there is a timing conflict between this point and control point 3, the most recently received command will have precedence.
TripSaver II recloser	1002, 2002 3002, 4002	Gateway Local Drop Open Control enable —This controls the gateway local drop-open capability of the TripSaver II recloser. A Latch On value enables the gateway drop-open capability and sets status point x022 active. A Latch Off value disables the gateway drop-open capability and sets status point x022 inactive.
TripSaver II recloser	1003, 2003, 3003, 4003	Communication gateway remote single-unit Drop Open command —This triggers the remote initiation of a single-unit Drop Open procedure. Initiation is a Close Pulse On value and is the equivalent of a momentary close.

Table 5. Group 0 Objects

Variation	Variation Name	Name—Definition
204	Device location longitude	This is the longitude of the gateway provided by GPS in decimal degrees based on the WGS84 reference. The special value of qNAN is returned when a GPS signal is not available. See DNP3 Technical Bulletin TB2016-005 for details on the special qNAN value.
205	Device location latitude	This is the latitude of the gateway provided by GPS in decimal degrees based on the WGS84 reference. The special value of qNAN is returned when a GPS signal is not available. (See DNP3 Technical Bulletin TB2016-005 for details on the special qNAN value.)
242	Device manufacturer's software version	The S&C implementation will return a single string containing all the software versions separated by spaces. The string will start with the gateway's version in format n.n.nnnnn. Then, the string will contain the first TripSaver II recloser's software version in format nn.nn.nn.nn. Four TripSaver II recloser versions will be returned. If a TripSaver II recloser is not present at the indicated positions in the DNP3 model, the string will contain the text <no_TripSaverII_present> instead of an actual version.
247	Device name	The S&C implementation will return a single string containing all the device names separated by spaces. Each device name will be a string with a maximum of 50 characters. The string will start with the gateway's device name followed by the TripSaver II recloser names. If a TripSaver II recloser is not present at the indicated position in the DNP3 model, the string will contain the text <no_TripSaverII_present>.
248	Device serial number	The S&C implementation will return a single string containing all the serial numbers separated by spaces. The string will start with the gateway's serial number in format Mnnnnnnn. Then, the string will contain the first TripSaver II recloser's serial number in format TCMR-nnnnnnn. Four TripSaver II recloser serial numbers will be returned. If a TripSaver II recloser is not present at the indicated positions in the DNP3 model, the string will contain the text <no_TripSaverII_present> instead of an actual serial number.
250	Device catalog number	The S&C implementation will return a single string containing all the catalog numbers separated by spaces. The string will start with the gateway's catalog number, where 5952 indicates a gateway with optional battery and 5953 indicates a gateway without the battery. Then, the string will contain the first TripSaver II recloser's catalog number. Four TripSaver II recloser catalog numbers will be returned. If a TripSaver II recloser is not present at the indicated position in the DNP3 model, the string will contain the text <no_TripSaverII_present> instead of an actual catalog number. If a TripSaver II recloser is present but its catalog number is not available, the string will contain <TripSaverII_catalog_number_unavailable>.

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.

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

Table 6. Device Profile Description

DNP 3 DEVICE PROFILE DOCUMENT	
Vendor Name: S&C Electric Company	
Device Name: TripSaver® II Communications Gateway	
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): 	
Maximum Data Link Frame Size (bytes) Transmitted - 292 Received - 292	Max Application Fragment Size (bytes) Transmitted - 2048 Received - 2048
Maximum Data link Re-tries: X X None _ Fixed at _ Configurable, range 1 to 25	Maximum Application Layer Re-tries: _ None _ Fixed at X Configurable, range 0 to 10 or 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) X When reporting Event Data (Slave devices only) _ When sending multi-fragment responses (Slave devices only) _ Sometimes If "Sometimes," when? _ Configurable If "Configurable," how?	

Table 6. Device Profile Description—continued

Timeouts while waiting for:				
Data Link Confirm	X None	_ Fixed	_ Variable	_ Config
Complete Appl. Fragment		_ None	X 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 on page 14 for explanation)				
Sends/Executes Control Operations:				
Write Binary Outputs	X Never	_ Always	_ Sometimes	_ Config
Select/Operate	_ Never	X Always	_ Sometimes	_ Config
Direct Operate	_ Never	X Always	_ Sometimes	_ Config
Direct Operate - NO ACK		_ Never	X Always	_ 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
Trip/Close	_ Never	_ Always	X Sometimes	_ Config
Queue	X Never	_ Always	_ Sometimes	_ Config
Clear Queue	X Never	_ Always	_ Sometimes	_ Config
Write Analog Outputs	_ Never	X Always	_ Sometimes	_ Config
Attach explanation if "Sometimes" or "Configurable" was checked See Note 4 on page 14 for an explanation.				
Maximum Select/Execute Delay Time:				
_ Not Applicable				
X Fixed at 10 seconds				
_ Configurable				

TABLE CONTINUED ►

DNP Implementation

Table 6. Device Profile Description—continued

<p>FILL OUT THE FOLLOWING ITEM FOR MASTER DEVICES ONLY:</p> <p>Master Expects Binary Input Change Events:</p> <ul style="list-style-type: none"> <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) 	
<p>FILL OUT THE FOLLOWING ITEMS FOR SLAVE DEVICES ONLY:</p> <p>TimeSynch Information</p> <p>a.) TimeSynch Period</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input checked="" type="checkbox"/> Fixed at 3600 seconds <input type="checkbox"/> Configurable <p>b.) Maximum time base drift over a 10-minute interval: <input type="checkbox"/> <1 _ ms (21 ms for real-time clock, < 1 ms for GPS)</p> <p>c.) Maximum Internal Time Reference Error when set via DNP: <input type="checkbox"/> ms</p> <p>d.) Maximum Delay Measurement error: <input type="checkbox"/> ms</p> <p>e.) Maximum Response time: <input type="checkbox"/> ms</p>	
<p>Reports Binary Input Change Events when no specific variation requested:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input checked="" type="checkbox"/> Only time-tagged <input type="checkbox"/> Only non-time-tagged <input type="checkbox"/> Configurable to send both 	<p>Reports time-tagged Binary Input Change Events when no specific variation requested:</p> <ul style="list-style-type: none"> <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)
<p>Sends Unsolicited Responses:</p> <ul style="list-style-type: none"> <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 2) 	<p>Sends Static Data in Unsolicited Responses:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Never <input type="checkbox"/> When Device Restarts <input type="checkbox"/> When Status Flags Change No other options are permitted.
<p>Supports Collision Avoidance:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Never <input type="checkbox"/> Always <input type="checkbox"/> Configurable (attach explanation) 	<p>Collision Avoidance Detection Method:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Link Activity <input type="checkbox"/> DCD - With aid of external device <input type="checkbox"/> DCD - Without aid of external device

TABLE CONTINUED ►

Table 6. Device Profile Description—continued

<p>Default Counter Object/Variation:</p> <ul style="list-style-type: none"> <input type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (explain) <input checked="" type="checkbox"/> Default Object - 20 Default Variation - 1 <input type="checkbox"/> Point-by-point list attached 	<p>Counters Roll Over at:</p> <ul style="list-style-type: none"> <input type="checkbox"/> No Counters Reported <input type="checkbox"/> Configurable (explain) <input type="checkbox"/> 16 Bits <input checked="" type="checkbox"/> 32 Bits <input type="checkbox"/> Other Value <input type="checkbox"/> Point-by-point list attached
<p>Analog Deadbands:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Fixed <p>Configurable:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Per Point <input type="checkbox"/> Per Analog Type <input type="checkbox"/> Global 	<p>Configurable Analog Deadbands:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> Configuration Software <input type="checkbox"/> Using Object 34 from the master station <input type="checkbox"/> Both configuration software and Object 34
<p>Are the updated deadband values preserved through a device reset:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <p>Deadband configuration limits for each point are preserved through a device reset. However, the most recent reported value for an input point is not retained.</p>	
<p>The maximum number of objects supported in a single control request for objects 12 and 41.</p> <p>Number of objects allowed for object 12: 1</p> <p>Number of objects allowed for object 41: 0</p>	
<p>Ability for REMOTE/LOCAL control mode:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> Per point <input type="checkbox"/> Per object <input type="checkbox"/> Global 	<p>Is the Event Buffer size configurable:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> NO fixed size: <input type="checkbox"/> See Note 3 <input type="checkbox"/> <input type="checkbox"/> YES range: <input type="checkbox"/> Configurable Per Class buffer: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES

TABLE CONTINUED ►

DNP Implementation

Table 6. Device Profile Description—continued

<p>Are the updated ENABLE/DISABLE unsolicited settings saved through a device reset:</p> <p><input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>The SCADA master is expected to resend the Disable Unsolicited Responses or Enabled Unsolicited Responses function code after a device reset.</p>	<p>Self Address Support using address 0xFFFC:</p> <p><input type="checkbox"/> YES (only allowed if configurable) <input checked="" type="checkbox"/> NO</p>
<p>Source Address Filtering:</p> <p><input checked="" type="checkbox"/> Not Supported <input type="checkbox"/> Configurable (attach explanation)</p>	
<p>Sends Multi-Fragment Responses (Slave Only): <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	

NOTE 1: Timeouts While Waiting for Confirmations

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

Set the **Delay Before Retry** setting via the TripSaver II Communication Gateway Web interface. See S&C Instruction Sheet 461-509 for more information.

NOTE 2: Unsolicited Responses

The TripSaver II Communication Gateway returns unsolicited responses to the configured master station address when a change occurs in any mapped status point that is configured for event reporting, or when the configured deadband is exceeded in any mapped analog input point or counter point that is configured for event reporting.

The outstation will not send any unsolicited responses until the SCADA master sends the **Enable Unsolicited Responses** command via the DNP3 protocol. In addition, the delivery of unsolicited response messages can be controlled by changing settings at the TripSaver II Communication Gateway Web interface. For each SCADA master, enable or disable unsolicited responses. Further control of the outstation behavior can be done with the **Indefinite Unsolicited Retries, Number of Retries for Confirm, Delay Before Retry, Unsolicited Transmit Delay Event Count, and Unsolicited Transmit Delay Time** settings. See S&C Instruction Sheet 461-509 for more information.

NOTE 3: Event Buffer Sizes

The TripSaver II Communication Gateway reserves multiple separate event buffers for different types of setpoints. The gateway has an event buffer length of 2000 for binary input change events, an event buffer length of 250 for analog input change events, and an event buffer length of 250 for counter change events.

NOTE 4: Control Operations

For all binary output operations, **Select/Operate, Direct Operate, and Direct Operate No Ack** control functions are allowed.

As detailed in the “Control Points” section of this specification, some binary output points will conform to the Complementary Latch Model and can be latched on or off by setting the **Op Type** mode to the **Latch On Or Latch Off** state. For these points, the **TCC** field must be set to the **NUL** state.

The remaining binary output points will conform to the activation model and can be activated by setting the **Op Type** state to **Pulse On** mode and the **TCC** state to **Close** mode.

The gateway ignores the **On Time** and **Off Time** values and the Queue and Clear flags in the control code.

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. All application-layer responses use the standard response function code 129. Unsolicited responses, if configured, will always use function code 130. Included in the table is the default variation returned if no specific variation is requested. This also applies to Class data and unsolicited reports where applicable.

DNP Implementation

Table 7. Implementation Table

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
1	0	Binary Input - All Variations	1	06	02
1	1	Binary Input	1	06	
1	2	Binary Input with Flag	1	06	
2	0	Binary Input Change - All Variations	1	06,07,08	02
2	1	Binary Input Change without Time	1	06,07,08	
2	2	Binary Input Change with Time (see Note 5 on page 16)	1	06,07,08	
10	0	Binary Output Status - All Variations	1	06	02
10	2	Binary Output Status	1	06	
12	1	Control Relay Output Block	3,4,5,6	17,28	echo of request if required
20	0	Binary Counter - All Variations	1	06	01
20	1	32-Bit Binary Counter with Flag	1	06	
20	5	32-Bit Binary Counter without Flag	1	06	
22	0	Counter Change Event - All Variations	1	06,07,08	01
22	1	32-Bit Counter Change Event without Time (See Note 5 on page 16)	1	06,07,08	
30	0	Analog Input - All Variations	1	06	01
30	1	32-Bit Analog Input with Flag	1	06	
30	2	16-Bit Analog Input with Flag	1	06	
30	3	32-Bit Analog Input without Flag	1	06	
30	4	16-Bit Analog Input without Flag	1	06	
32	0	Analog Change Event - All Variations	1	06,07,08	03
32	1	32-Bit Analog Change Event without Time	1	06,07,08	
32	3	32-Bit Analog Change Event with Absolute Time (See Note 5 on page 16)	1	06,07,08	
60	1	Class 0 Data	1	06	
60	2	Class 1 Data	1	06,07,08	
60	3	Class 2 Data	1	06,07,08	
60	4	Class 3 Data	1	06,07,08	
80	1	Internal Indications	2	00 index=7	
No Object			13		

NOTE 5: Change Events

This is the default object returned in the unsolicited report by exception (if enabled) and the default object for any event class data request.

NOTE 6: Binary Output Status

In a response to a **Binary Output Status** request, the switch control returns a status bit 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. The state of all digital bits (controlled and not controlled) can be inspected by using the associated **Binary Input** object.