DNP3 Device Profile
Based on DNP XML Schema version 2.10.00

Document Name: MGate 5109 Device Profile

Document Description: Device Profile for the MGate 5109

Revision History

Date	Time	Version	Reason for change	Edited by
2018-10-03		1	First Version	Lance Chen

REFERENCE DEVICE:

1 Device Properties

This document is intended to be used for several purposes, including:

- Identifying the capabilities of a DNP3 device (Master Station or Outstation)

- Recording the settings of a specific instance of a device (parameter settings for a specific instance of the device in the user's total DNP3 estate)

- Matching user requirements to product capabilities when procuring a DNP3 device

The document is therefore structured to show, for each technical feature, the capabilities of the device (or capabilities required by the device when procuring).

It is also structured to show the current value (or setting) of each of the parameters that describe a specific instance of the device. This "current value" may also show a functional limitation of the device. For example when implementing secure authentication it is not required that all DNP3 devices accept aggressive mode requests during critical exchanges (see Device Profile 1.12.4), in which case a vendor would mark this current value as "No - does not accept aggressive mode requests".

Additionally, the current value may sometimes be used to show a value that a device can achieve because of hardware or software dependencies. An example of this is in section 1.6.8 of the Device Profile (Maximum error in the time that the Master issues freeze requests) where the value may well depend upon tolerances of hardware components and interactions between software tasks. When the Device Profile current value is used in this way the corresponding entry in the capabilities column is grayed-out. Users should note that if an entry in the capabilities column of the Device Profile is grayed-out then there may be information in the current value column that is pertinent to the device's capabilities.

Unless otherwise noted, multiple boxes in the second column below are selected for each parameter to indicate all capabilities supported or required. Parameters without checkboxes in the second column do not have capabilities and are included so that the current value may be shown in the third column.

The items listed in the capabilities column below may be configurable to any of the options selected, or set to a fixed value when the device was designed. Item 1.1.10 contains a list of abbreviations for the possible ways in which the configurable parameters may be set. Since some parameters may not be accessible by each of these methods supported, an abbreviation for the configuration method supported by each parameter is shown in the fourth column of the tables below.

If this document is used to show the current values, the third column should be filled in even if a fixed parameter is selected in the capabilities section ("NA" may be entered for parameters that are Not Applicable).

If the document is used to show the current values of parameters, then column 3 applies to a single connection between a master and an outstation.

1.1 DEVICE IDENTIFICATION	**Capabilities**	**Current Value**	**If configurable list methods**
1.1.1 Device Function: *Masters send DNP requests, while Outstations send DNP responses. If a single physical device can perform both functions, a separate Device Profile Document must be provided for each function.*	○ Master ◉ Outstation	○ Master ◉ Outstation	

1.1.2 Vendor Name: *The name of the organization producing the device.* *Note: The current value of this outstation parameter is available remotely using protocol object Group 0 Variation 252.*		Moxa Inc.	
1.1.3 Device Name: *The model and name of the device, sufficient to distinguish it from any other device from the same organization.* *Note: The current value of this outstation parameter is available remotely using protocol object Group 0 Variation 250.*		MGate 5109 Series	
1.1.4 Device manufacturer's hardware version string: *Note: The current value of this outstation parameter is available remotely using protocol object Group 0 Variation 243.*		V1.0.0	
1.1.5 Device manufacturer's software version string: *Note: The current value of this outstation parameter is available remotely using protocol object Group 0 Variation 242.*		V1.4.0	
1.1.6 Device Profile Document Version Number: *Version of the Device Profile Document is indicated by a whole number incremented with each new release. This should match the latest version shown in the Revision History at the beginning of this document.*		1	
1.1.7 DNP Levels Supported for: *Indicate each DNP3 Level to which the device conforms fully. For Masters, requests and responses can be indicated independently.*	Outstations Only Requests and Responses ☐ None ☑ Level 1 ☑ Level 2 ☐ Level 3 ☐ Level 4	Level 2	
1.1.8 Supported Function Blocks:	☑ Self Address Support ☐ Data Sets ☐ File Transfer ☐ Virtual Terminal ☐ Mapping to IEC 61850 Object Models defined in a DNP3 XML file ☐ Function code 31, activate configuration ☐ Secure Authentication (if checked then see 1.12)	Self Address	other (Web Browser)
1.1.9 Notable Additions: *A brief description intended to quickly identify (for the reader) the most obvious features the device supports in addition to the Highest DNP Level Supported. The complete list of features is described in the Implementation Table.*			
1.1.10 Methods to set Configurable Parameters:	☐ XML - Loaded via DNP3 File Transfer ☐ XML - Loaded via other transport mechanism ☐ Terminal - ASCII Terminal Command Line ☐ Software - Vendor software named ☐ Proprietary file loaded via DNP3 File Transfer ☐ Proprietary file loaded via other transport mechanism ☐ Direct - Keypad on device front panel ☐ Factory - Specified when device is ordered ☐ Protocol - Set via DNP3 (e.g. assign class) ☑ Other - explain:**Web Browser**	Other, **Web Browser**	other (Web Browser)

1.1.11 DNP3 XML files available On-line: *XML configuration file names that can be read or written through DNP3 File Transfer to a device.* *A device's currently running configuration is returned by DNP3 on-line XML file read from the device.* *DNP3 on-line XML file write to a device will update the device's configuration when the Activate Configuration (function code 31) is received.*	Rd Wr Filename Description of Contents ☐ dnpDP.xml Complete Device Profile ☐ dnpDPCap.xml Device Profile Capabilities ☐ dnpDPCfg.xml Device Profile config values	Rd Wr Filename ☐ dnpDP.xml ☐ dnpDPCap.xml ☐ dnpDPCfg.xml	
1.1.12 External DNP3 XML files available Off-line: *XML configuration file names that can be read or written from an external system, typically from a system that maintains the outstation configuration.* *External off-line XML file read permits an XML definition of a new configuration to be supplied from off-line configuration tools.* *External off-line XML file write permits an XML definition of a new configuration to be supplied to off-line configuration tools.*	Rd Wr Filename Description of Contents ☐ ☐ dnpDP.xml Complete Device Profile ☐ ☐ dnpDPCap.xml Device Profile Capabilities ☐ ☐ dnpDPCfg.xml Device Profile config values	Rd Wr Filename ☐ ☐ dnpDP.xml ☐ ☐ dnpDPCap.xml ☐ ☐ dnpDPCfg.xml	
1.1.13 Connections Supported:	☑ Serial (complete section 1.2) ☑ IP Networking (complete section 1.3) ☐ Other, explain	Serial IP Networking	
1.1.14 Conformance Testing: *Where conformance testing has been completed for the outstation or master station, specify the version of the published DNP3 test procedures that was successfully passed. If independently tested, identify the organization that performed the test.*	☑ Self-tested, version Rev 2.6 (2009) ☐ Independently tested, version		

1.2 Serial Connections	**Capabilities**	**Current Value**	**If configurable list methods**
1.2.1 Port Name: *Name used to reference the communications port defined in this section.*		COM1	
1.2.2 Serial Connection Parameters:	☑ Asynchronous - 8 Data Bits, 1 Start Bit, 1 Stop Bit, No Parity ☑ Other, explain **8 Data Bits, 1 Start Bit, 1/2 Stop Bit, No Parity/Odd/Even/Mark/Space** Note: Implemented in Target Layer	Other, **8 Data Bits, 1 Start Bit, 1 Stop Bit, Even Parity**	other (Web Browser)
1.2.3 Baud Rate:	☐ Fixed at ☐ Configurable, range to ☑ Configurable, selectable from **50**, **75**, **110**, **134**, **150**, **300**, **600**, **1200**, **1800**, **2400**, **4800**, **9600**, **19200**, **38400**, **57600**, **115200**, **230400**, **460800**, **921600** ☐ Configurable, other, describe Note: Implemented in Target Layer	115200	other (Web Browser)

1.2.4 Hardware Flow Control (Handshaking): *Describe hardware signaling requirements of the interface.* *Where a transmitter or receiver is inhibited until a given control signal is asserted, it is considered to require that signal prior to sending or receiving characters.* *Where a signal is asserted prior to transmitting, that signal will be maintained active until after the end of transmission.* *Where a signal is asserted to enable reception, any data sent to the device when the signal is not active could be discarded.*	☑ None **RS-232 / V.24 / V.28 Options:** Asserts: ☑ RTS Before Tx ☐ DTR Before Tx ☑ RTS Before Rx ☐ DTR Before Rx ☐ Always RTS ☐ Always DTR Requires Before Tx: CTS ☑ Asserted ☐ Deasserted DCD ☐ Asserted ☐ Deasserted DSR ☐ Asserted ☐ Deasserted RI ☐ Asserted ☐ Deasserted ☐ Requires Rx Inactive before Tx Requires Before Rx: CTS ☐ Asserted ☐ Deasserted DCD ☐ Asserted ☐ Deasserted DSR ☐ Asserted ☐ Deasserted RI ☐ Asserted ☐ Deasserted Always Ignores: ☐ CTS ☑ DCD ☐ DSR ☑ RI ☐ Other, explain **RS-422 / V.11 Options:** ☐ Requires Indication before Rx ☐ Asserts Control before Tx ☐ Other, explain **RS-485 Options:** ☐ Requires Rx inactive before Tx ☐ Other, explain ☑ Other, explain **Sofware**	None **RS-232 / V.24 / V.28 Options:** **RS-422 / V.11 Options:** **RS-485Options:**	other (Web Browser)
1.2.5 Interval to Request Link Status: *Indicates how often to send Data Link Layer status requests on a serial connection. This parameter is separate from the TCP Keep-alive timer.*	☑ Not Supported ☐ Fixed at seconds ☐ Configurable, range to seconds ☐ Configurable, selectable from seconds ☐ Configurable, other, describe	Not Supported	
1.2.6 Supports DNP3 Collision Avoidance: *Indicates whether an Outstation uses a collision avoidance algorithm.* *Collision avoidance may be implemented by a back-off timer with two parameters that define the back-off time range or by some other vendor-specific mechanism.* *The recommended back-off time is specified as being a fixed minimum delay plus a random delay, where the random delay has a maximum value specified. This defines a range of delay times that are randomly distributed between the minimum value and the minimum plus the maximum of the random value.* *If a back-off timer is implemented with only a fixed or only a random value, select the Back-off time method and set the parameter that is not supported to "Fixed at 0 ms".*	☑ No ☐ Yes, using Back-off time = (Min + Random) method ☐ Other, explain	No	

1.2.7 Receiver Inter-character Timeout: *When serial interfaces with asynchronous character framing are used, this parameter indicates if the receiver makes a check for gaps between characters. (i.e. extensions of the stop bit time of one character prior to the start bit of the following character within a message). If the receiver performs this check and the timeout is exceeded then the receiver discards the current data link frame. A receiver that does not discard data link frames on the basis of inter-character gaps is considered not to perform this check.* *Where no asynchronous serial interface is fitted this parameter is not applicable. In this case none of the options shall be selected.*	☑ Not Checked ☐ No gap permitted ☐ Fixed at bit times ☐ Fixed at ms ☐ Configurable, range to bit times ☐ Configurable, range to ms ☐ Configurable, selectable from bit times ☐ Configurable, selectable from ms ☐ Configurable, other, describe ☐ Variable, explain	Not Checked	
1.2.8 Inter-character gaps in transmission: *When serial interfaces with asynchronous character framing are used, this parameter indicates whether extra delay is ever introduced between characters in the message, and if so, the maximum width of the gap.* *Where no asynchronous serial interface is fitted this parameter is not applicable. In this case none of the options shall be selected.*	☑ None (always transmits with no inter-character gap) ☐ Maximumbit times ☐ Maximumms	None	

1.3 IP NETWORKING	**Capabilities**	**Current Value**	**If configurable list methods**
1.3.1 Port Name: *Name used to reference the communications port defined in this section.*		Ethernet Port	
1.3.2 Type of End Point:	☐ TCP Initiating (Master Only) ☑ TCP Listening (Outstation Only) ☐ TCP Dual (required for Masters) ☑ UDP Datagram (required)	TCP Listening UDP Datagram	other (Web Browser)
1.3.3 IP Address of this Device:		192.168.127.254	other (Web Browser)
1.3.4 Subnet Mask:		255.255.255.0	other (Web Browser)
1.3.5 Gateway IP Address:			other (Web Browser)
1.3.6 Accepts TCP Connections or UDP Datagrams from:	☑ Allows all (show as *.*.*.* in 1.3.7) ☐ Limits based on IP address ☑ Limits based on list of IP addresses ☐ Limits based on a wildcard IP address ☐ Limits based on list of wildcard IP addresses ☐ Other, explain	Allows all	other (Web Browser)
1.3.7 IP Address(es) from which TCP Connections or UDP Datagrams are accepted:		*.*.*.*	other (Web Browser)
1.3.8 TCP Listen Port Number: *If Outstation or dual end point Master, port number on which to listen for incoming TCP connect requests. Required to be configureable for Masters and recommended to be configurable for Outstations.*	☐ Not Applicable (Master w/o dual end point) ☐ Fixed at 20,000 ☑ Configurable, range **1** to **65535** ☐ Configurable, selectable from ☐ Configurable, other, describe	20000	other (Web Browser)
1.3.9 TCP Listen Port Number of remote device: *If Master or dual end point Outstation, port number on remote device with which to initiate connection. Required to be configurable for Masters and recommended to be configurable for Outstations.*	☑ Not Applicable (Outstation w/o dual end point) ☐ Fixed at 20,000 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Not Applicable	

1.3.10 TCP Keep-alive timer: *The time period for the keep-alive timer on active TCP connections.*	☑ Fixed at **60000**ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Configurable, other, describe	60000 ms	
1.3.11 Local UDP port: *Local UDP port for sending and/or receiving UDP datagrams. Masters may let system choose an available port. Outstations must use one that is known by the Master.*	☐ Fixed at 20,000 ☑ Configurable, range **1** to **65535** ☐ Configurable, selectable from ☐ Configurable, other, describe ☐ Let system choose (Master only)	20000	other (Web Browser)
1.3.12 Destination UDP port for DNP3 Requests (Masters Only):	☐ Fixed at 20,000 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe		other (Web Browser)
1.3.13 Destination UDP port for initial unsolicited null responses (UDP only Outstations): *The destination UDP port for sending initial unsolicited Null response.*	☐ None ☐ Fixed at 20,000 ☑ Configurable, range **1** to **65535** ☐ Configurable, selectable from ☐ Configurable, other, describe	20000	
1.3.14 Destination UDP port for responses (UDP only Outstations): *The destination UDP port for sending all responses other than the initial unsolicited Null response.*	☐ None ☐ Fixed at 20,000 ☑ Configurable, range **1** to **65535** ☐ Configurable, selectable from ☐ Configurable, other, describe ☐ Use source port number	20000	
1.3.15 Multiple outstation connections (Masters only): *Indicates whether multiple outstation connections are supported.*	☐ Supports multiple outstations (Masters only)		
1.3.16 Multiple master connections (Outstations only): *Indicates whether multiple master connections are supported and the method that can be used to establish connections.*	☐ Supports multiple masters (Outstations only) If supported, the following methods may be used: ☐ Method 1 (based on IP address) - required ☐ Method 2 (based on IP port number) - recommended ☐ Method 3 (browsing for static data) - optional	Not supported	other (Web Browser)
1.3.17 Time synchronization support:	☐ DNP3 LAN procedure (function code 24) ☑ DNP3 Write Time (not recommended over LAN) ☐ Other, explain ☐ Not Supported	Write Time	

1.4 LINK LAYER	**Capabilities**	**Current Value**	**If configurable list methods**
1.4.1 Data Link Address: *Indicates if the link address is configurable over the entire valid range of 0 to 65,519. Data link addresses 0xFFF0 through 0xFFFF are reserved for broadcast or other special purposes.*	☐ Fixed at ☑ Configurable, range **0** to **65519** ☐ Configurable, selectable from ☐ Configurable, other, describe	4	other (Web Browser)
1.4.2 DNP3 Source Address Validation: *Indicates whether the Outstation will filter out requests not from a specific source address.*	☐ Never ☑ Always, one address allowed (shown in 1.4.3) ☐ Always, any one of multiple addresses allowed (each selectable as shown in 1.4.3) ☐ Sometimes, explain	Always - single address	
1.4.3 DNP3 Source Address(es) expected when Validation is Enabled: *Selects the allowed source address(es)*	☐ Configurable to any 16 bit DNP Data Link Address value ☑ Configurable, range **0** to **65519** ☐ Configurable, selectable from ☐ Configurable, other, describe	3	
1.4.4 Self Address Support using address 0xFFFC: *If an Outstation receives a message with a destination address of 0xFFFC it shall respond normally with its own source address. It must be possible to diasble this feature if supported.*	☑ Yes (only allowed if configurable) ☑ No	Yes	other (Web Browser)

1.4.5 Sends Confirmed User Data Frames: *A list of conditions under which the device transmits confirmed link layer services (TEST_LINK_STATES, RESET_LINK_STATES, CONFIRMED_USER_DATA).*	☑ Never ☑ Always ☐ Sometimes, explain	Always	other (Web Browser)
1.4.6 Data Link Layer Confirmation Timeout: *This timeout applies to any secondary data link message that requires a confirm or response (link reset, link status, user data, etc).*	☐ None ☐ Fixed at ms ☑ Configurable, range **0** to **65535**ms ☐ Configurable, selectable from ms ☐ Configurable, other, describe ☐ Variable, explain	3000ms	other (Web Browser)
1.4.7 Maximum Data Link Retries: *The number of times the device will retransmit a frame that requests Link Layer confirmation.*	☐ None ☐ Fixed at ☑ Configurable, range **0** to **5** ☐ Configurable, selectable from ☐ Configurable, other, describe	5	other (Web Browser)
1.4.8 Maximum number of octets Transmitted in a Data Link Frame: *This number includes the CRCs. With a length field of 255, the maximum size would be 292.*	☑ Fixed at **292** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	292	
1.4.9 Maximum number of octets that can be Received in a Data Link Frame: *This number includes the CRCs. With a field length of 255, the maximum size would be 292. The device must be able to receive 292 octets to be compliant.*	☑ Fixed at **292** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	292	

1.5 Application Layer	**Capabilities**	**Current Value**	**If configurable list methods**
1.5.1 Maximum number of octets Transmitted in an Application Layer Fragment other than File Transfer: *This size does not include any transport or frame octets.* *- Masters must provide a setting less than or equal to 249 to be compliant.* *- Outstations must provide a setting less than or equal to 2048 to be compliant.* *Note: The current value of this outstation parameter is available remotely using protocol object Group 0 Variation 240.*	☑ Fixed at **2048** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	2048	
1.5.2 Maximum number of octets Transmitted in an Application Layer Fragment containing File Transfer:	☑ Fixed at **4096** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	4096	
1.5.3 Maximum number of octets that can be received in an Application Layer Fragment: *This size does not include any transport or frame octets.* *- Masters must provide a setting greater than or equal to 2048 to be compliant.* *- Outstations must provide a setting greater than or equal to 249 to be compliant.* *Note: The current value of this outstation parameter is available remotely using protocol object Group 0 Variation 241.*	☑ Fixed at **249** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe		
1.5.4 Timeout waiting for Complete Application Layer Fragment: *Timeout if all frames of a message fragment are not received in the specified time. Measured from time first frame of a fragment is received until the last frame is received.*	☑ None ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Configurable, other, describe ☐ Variable, explain	None	other (Web Browser)

1.5.5 Maximum number of objects allowed in a single control request for CROB (Group 12): *Note: The current value of this outstation parameter is available remotely using protocol object Group 0 Variation 216.*	☐ Fixed at (enter 0 if controls are not supported for CROB) ☑ Configurable, range **0** to **4294967295** ☐ Configurable, selectable from ☑ Configurable, other, describe**The maximum Number of objects allowed in a single Control Request for CROB is only limited by the maximum length of a data link frame** ☐ Variable, explain		
1.5.6 Maximum number of objects allowed in a single control request for Analog Outputs (Group 41):	☐ Fixed at (enter 0 if controls are not supported for Analog Outputs) ☑ Configurable, range **0** to **4294967295** ☐ Configurable, selectable from ☑ Configurable, other, describe**The maximum Number of objects allowed in a single Control Request for CROB is only limited by the maximum length of a data link frame** ☐ Variable, explain		
1.5.7 Maximum number of objects allowed in a single control request for Data Sets (Groups 85, 86, 87):	☐ Fixed at (enter 0 if controls are not supported for Data Sets) ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe ☐ Variable, explain		
1.5.8 Supports mixed object groups (AOBs, CROBs and Data Sets) in the same control request:	☐ Not applicable - controls are not supported ☐ Yes ☑ No	No	
1.5.9 Control Status Codes Supported: *Indicates which control status codes are supported by the device:* *- Masters must indicate which control status codes they accept in outstation responses.* *- Outstations must indicate which control status codes they generate in responses.* *Control status code 0 (success) must be supported by Masters and Outstations.*	☑ 1 - TIMEOUT ☑ 2 - NO_SELECT ☑ 3 - FORMAT_ERROR ☑ 4 - NOT_SUPPORTED ☐ 5 - ALREADY_ACTIVE ☐ 6 - HARDWARE_ERROR ☐ 7 - LOCAL ☑ 8 - TOO_MANY_OBJS ☐ 9 - NOT_AUTHORIZED ☐ 10 - AUTOMATION_INHIBIT ☐ 11 - PROCESSING_LIMITED ☑ 12 - OUT_OF_RANGE ☐ 13 - DOWNSTREAM_LOCAL ☐ 14 - ALREADY_COMPLETE ☐ 15 - BLOCKED ☐ 16 - CANCELLED ☐ 17 - BLOCKED_OTHER_MASTER ☐ 18 - DOWNSTREAM_FAIL ☐ 126 - RESERVED ☐ 127 - UNDEFINED		

1.7 Fill Out The Following Items For Outstations Only	**Capabilities**	**Current Value**	**If configurable list methods**
1.7.1 Timeout waiting for Application Confirm of solicited response message:	☐ None ☐ Fixed at ms ☑ Configurable, range **1000** to **1000000**ms ☐ Configurable, selectable from ms ☐ Configurable, other, describe ☐ Variable, explain	10000ms	other (Web Browser)
1.7.2 How often is time synchronization required from the master: *Details of when the master needs to perform a time synchronization to ensure that the outstation clock does not drift outside of an acceptable tolerance. If the option to relate this to IIN1.4 is used then details of when IIN1.4 is asserted are in section 1.10.2.*	☑ Never needs time ☐ Within seconds after IIN1.4 is set ☑ Periodically, fixed at **3600** seconds ☐ Periodically, between and seconds	Periodically, every 3600 seconds.	other (Web Browser)
1.7.3 Device Trouble Bit IIN1.6: *If IIN1.6 device trouble bit is set under certain conditions, explain the possible causes.*	☑ Never used ☐ Reason for setting	Never used	

1.7.4 File Handle Timeout: *If there is no activity referencing a file handle for a configurable length of time, the outstation must do an automatic close on the file. The timeout value must be configurable up to 1 hour. When this condition occurs the outstation will send a File Transport Status Object (obj grp 70 var 6) using a status code value of handle expired (0x02).*	☑ Not applicable, files not supported ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Configurable, other, describe ☐ Variable, explain	Not applicable	
1.7.5 Event Buffer Overflow Behavior:	☑ Discard the oldest event ☑ Discard the newest event ☐ Other, explain	Discard oldest	other (Web Browser)
1.7.6 Event Buffer Organization: *Explain how event buffers are arranged (per Object Group, per Class, single buffer, etc) and specify the number of events that can be buffered.*	☑ Per Object Group (see part 3) ☐ Per Class Class 1: ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe Class 2: ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe Class 3: ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe ☐ Single Buffer ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe ☐ Other, describe	Per object group	
1.7.7 Sends Multi-Fragment Responses: *Indicates whether an Outstation sends multi-fragment responses (Masters do not send multi-fragment requests).*	☑ Yes ☐ No	Yes	
1.7.8 Last Fragment Confirmation: *Indicates whether the Outstation requests confirmation of the last fragment of a multi-fragment response.*	☑ Always ☐ Sometimes, explain ☑ Never	Never	other (Web Browser)
1.7.9 DNP Command Settings preserved through a device restart: *If any of these settings are written through the DNP protocol and they are not preserved through a restart of the Outstation, the Master will have to write them again after it receives a response in which the Restart IIN bit is set.*	☐ Assign Class ☐ Analog Deadbands ☐ Data Set Prototypes ☐ Data Set Descriptors ☐ Function Code 31 Activate Configuration		
1.7.10 Supports configuration signature: *Indicates whether an Outstation supports the Group 0 device attribute "Configuration signature" (variation 200). If yes, list the vendor-defined name(s) of the algorithm(s) available to calculate the signature.* *Note: The algorithm used for calculating the signature is identified by name in a string that can be determined remotely using protocol object Group 0 Variation 201. If only a single algorithm is available, identifying that algorithm in this object is optional.*	☐ Configuration signature supported If configuration signature is supported, then the following algorithm(s) are available for calculating the signature:	Not Supported	

1.7.11 Requests Application Confirmation: *Indicate if application confirmation is requested:* *- when responding with events* *- when sending non-final fragments of multi-fragment responses* *Note: to be compliant both must be selected as "yes".*	For event responses: (•) Yes ( ) No ( ) Configurable For non-final fragments: (•) Yes ( ) No ( ) Configurable	Event responses: Yes Non-final fragments: Yes	

1.8 Outstation Unsolicited Response Support	**Capabilities**	**Current Value**	**If configurable list methods**
1.8.1 Supports Unsolicited Reporting: *When the unsolicited response mode is configured "off", the device is to behave exactly like an equivalent device that has no support for unsolicited responses. If set to "on", the Outstation will send a null Unsolicited Response after it restarts, then wait for an Enable Unsolicited Response command from the master before sending additional Unsolicited Responses containing event data.*	☐ Yes ☐ No ☑ Configurable, selectable from On and Off	On	other (Web Browser)
1.8.2 Master Data Link Address: *The destination address of the master device where the unsolicited responses will be sent.*	☐ Fixed at ☑ Configurable, range **1** to **65519** ☐ Configurable, selectable from ☐ Configurable, other, describe	3	other (Web Browser)
1.8.3 Unsolicited Response Confirmation Timeout: *This is the amount of time that the outstation will wait for an Application Layer confirmation back from the master indicating that the master received the unsolicited response message. As a minimum, the range of configurable values must include times from one second to one minute. This parameter may be the same one that is used for normal, solicited, application confirmation timeouts, or it may be a separate parameter.*	☐ Fixed at ms ☑ Configurable, range **0** to **4294967295**ms ☐ Configurable, selectable from ms ☑ Configurable, other, describe**Unsolicited Response Confirmation Timeout is same as Application Confrim timeout** ☐ Variable, explain	10000 ms	
1.8.4 Number of Unsolicited Retries: *This is the number of retries that an outstation transmits in each unsolicited response series if it does not receive confirmation back from the master. The configured value includes identical and regenerated retry messages. One of the choices must provide for an indefinite (and potentially infinite) number of transmissions.*	☐ None ☐ Fixed at ☑ Configurable, range **0** to **100** ☐ Configurable, selectable from ☐ Configurable, other, describe ☐ Always infinite, never gives up	5	other (Web Browser)

1.9 Outstation Unsolicited Response Trigger Conditions	**Capabilities**	**Current Value**	**If configurable list methods**
1.9.1 Number of class 1 events:	☐ Class 1 not used to trigger Unsolicited Responses ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe		
1.9.2 Number of class 2 events:	☐ Class 2 not used to trigger Unsolicited Responses ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe		
1.9.3 Number of class 3 events:	☐ Class 3 not used to trigger Unsolicited Responses ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe		

1.9.4 Total number of events from any class:	☐ Total Number of Events not used to trigger Unsolicited Responses ☑ Fixed at **1024** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	1024	
1.9.5 Hold time after class 1 event: *A configurable value of 0 indicates that responses are not delayed due to this parameter.*	☐ Class 1 not used to trigger Unsolicited Responses ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Configurable, other, describe		
1.9.6 Hold time after class 2 event: *A configurable value of 0 indicates that responses are not delayed due to this parameter.*	☐ Class 2 not used to trigger Unsolicited Responses ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Configurable, other, describe		
1.9.7 Hold time after class 3 event: *A configurable value of 0 indicates that responses are not delayed due to this parameter.*	☐ Class 3 not used to trigger Unsolicited Responses ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Configurable, other, describe		
1.9.8 Hold time after event assigned to any class: *A configurable value of 0 indicates that responses are not delayed due to this parameter.*	☐ Class events not used to trigger Unsolicited Responses ☐ Fixed at ms ☑ Configurable, range **1** to **9999**ms ☐ Configurable, selectable from ms ☐ Configurable, other, describe	1000 ms	
1.9.9 Retrigger Hold Time: *The hold-time timer may be retriggered for each new event detected (increased possibility of capturing all the changes in a single response) or not retriggered (giving the master a guaranteed update time).*	☐ Hold-time timer will be retriggered for each new event detected (may get more changes in next response) ☑ Hold-time timer will not be retriggered for each new event detected (guaranteed update time)	Not retriggered	
1.9.10 Other Unsolicited Response Trigger Conditions:		Other,	

1.10 Outstation Performance	**Capabilities**	**Current Value**	**If configurable list methods**
1.10.1 Maximum Time Base Drift (milliseconds per minute): *If the device is synchronized by DNP, what is the clock drift rate over the full operating temperature range.*	☐ Fixed at ms ☐ Range to ms ☐ Selectable from ms ☐ Other, describe		
1.10.2 When does outstation set IIN1.4: *When does the outstation set the internal indication IIN1.4 NEED_TIME*	☑ Never ☑ Asserted at startup until first Time Synchronization request received ☑ Periodically every **3600** seconds ☐ Periodically, range to seconds ☐ Periodically, selectable from seconds ☐ seconds after last time sync ☐ Range to seconds after last time sync ☐ Selectable from seconds after last time sync ☐ When time error may have drifted by ms ☐ When time error may have drifted by range to ms ☐ When time error may have drifted by selectable from ms		other (Web Browser)
1.10.3 Maximum Internal Time Reference Error when set via DNP (ms): *The difference between the time set in DNP Write Time message, and the time actually set in the outstation.*	☐ Fixed at ms ☑ Range **10** to **30**ms ☐ Selectable from ms ☐ Other, describe	20 ms	
1.10.4 Maximum Delay Measurement Error (ms): *The difference between the time reported in the delay measurement response and the actual time between receipt of the delay measurement request and issuing the delay measurement reply.*	☐ Fixed at ms ☑ Range **10** to **30**ms ☐ Selectable from ms ☐ Other, describe	20 ms	

1.10.5 Maximum Response Time (ms): *The amount of time an outstation will take to respond upon receipt of a valid request. This does not include the message transmission time.*	☐ Fixed at ms ☑ Range **10** to **20**ms ☐ Selectable from ms ☐ Other, describe	20 ms	
1.10.6 Maximum time from start-up to IIN 1.4 assertion (ms):	☐ Fixed at ms ☑ Range **7000** to **10000**ms ☐ Selectable from ms ☐ Other, describe	7000 ms	
1.10.7 Maximum Event Time-tag error for local Binary and Double Bit I/O (ms): *The error between the time-tag reported and the absolute time of the physical event. This error includes the Internal Time Reference Error.* *Note: The current value of this parameter is available remotely using protocol object Group 0 Variation 217.*	☐ Fixed at ms ☑ Range **20** to **30**ms ☐ Selectable from ms ☐ Other, describe	20 ms	
1.10.8 Maximum Event Time-tag error for local I/O other than Binary and Double Bit data types (ms):	☐ Fixed at ms ☑ Range **20** to **30**ms ☐ Selectable from ms ☐ Other, describe	20 ms	

1.11 Individual Field Outstation Parameters	**Value of Current Setting**	**If configurable list methods**
1.11.1 User-assigned location name or code string (same as g0v245):		
1.11.2 User-assigned ID code/number string (same as g0v246):		
1.11.3 User-assigned name string for the outstation (same as g0v247):		
1.11.4 Device Serial Number string (same as g0v248):		

1.13 Broadcast Functionality	**Capabilities**	**Current Value**	**If configurable list methods**
This section indicates which functions are supported by the device when using broadcast addresses. Note that this section shows only entries that may have a meaningful purpose when used with broadcast requests.			
1.13.1 Support for broadcast functionality:	○ Disabled ◉ Enabled ○ Configurable	Enabled	
1.13.2 Write functions (FC = 2) supported with broadcast requests:	Write clock (g50v1 with qualifier code 07) ○ Disabled ◉ Enabled ○ Configurable, other (described elsewhere) Write last recorded time (g50v3 with qualifier code 07) ◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere) Clear restart (g80v1 with qualifier code 00 and index = 7, value = 0) ◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere) Write to any other group / variation / qualifier code ◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Write clock: Enabled Write last recorded time: Disabled Clear restart: Disabled Write any other: Disabled	Clock: Time: Restart: Other:
1.13.3 Direct operate functions (FC = 5) supported with broadcast requests:	○ Disabled ◉ Enabled ○ Configurable, other (described elsewhere)	Enabled	
1.13.4 Direct operate, no acknowledgement functions (FC = 6) supported with broadcast requests:	○ Disabled ◉ Enabled ○ Configurable, other (described elsewhere)	Enabled	
1.13.5 Immediate freeze functions (FC = 7) supported with broadcast requests:	○ Disabled ◉ Enabled ○ Configurable, other (described elsewhere)	Enabled	

1.13.6 Immediate freeze, no acknowledgement functions (FC = 8) supported with broadcast requests:	○ Disabled ◉ Enabled ○ Configurable, other (described elsewhere)	Enabled	
1.13.7 Freeze and clear functions (FC = 9) supported with broadcast requests:	○ Disabled ◉ Enabled ○ Configurable, other (described elsewhere)	Enabled	
1.13.8 Freeze and clear, no acknowledgement functions (FC = 10) supported with broadcast requests:	○ Disabled ◉ Enabled ○ Configurable, other (described elsewhere)	Enabled	
1.13.9 Freeze at time functions (FC = 11) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.10 Freeze at time, no acknowledgement functions (FC = 12) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.11 Cold restart functions (FC = 13) supported with broadcast requests:	○ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.12 Warm restart functions (FC = 14) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.13 Initialize data functions (FC = 15) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.14 Initialize application functions (FC = 16) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.15 Start application functions (FC = 17) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.16 Stop application functions (FC = 18) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.17 Save configuration functions (FC = 19) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.18 Enable unsolicited functions (FC = 20) supported with broadcast requests:	Enable unsolicited by event Class (g60v2, g60v3 and g60v4 with qualifier code 06) ◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere) Enable unsolicited for any other group / variation / qualifier code ◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	By event class: Disabled By any other: Disabled	Class: Other:
1.13.19 Disable unsolicited functions (FC = 21) supported with broadcast requests:	Disable unsolicited by event Class (g60v2, g60v3 and g60v4 with qualifier code 06) ◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere) Disable unsolicited for any other group / variation / qualifier code ◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	By event class: Disabled By any other: Disabled	Class: Other:
1.13.20 Assign class functions (FC = 22) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.21 Record current time functions (FC = 24) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	
1.13.22 Activate configuration functions (FC = 31) supported with broadcast requests:	◉ Disabled ○ Enabled ○ Configurable, other (described elsewhere)	Disabled	

2 Mapping between DNP3 and IEC 61850 Objects

This optional section allows each configuration parameter or point in the DNP Data map to be tied to an attribute in the IEC 61850 object models (and vice-versa).

Earlier versions of this section (up to version 2.07) used mappings based on an "access point" (section 2.1.1 and then a series of XPath references (section 2.1.2). Section 2.1.2 has been superseded in version 2.08 onwards with mappings defined using either predefined rules (section 2.1.3) or specified as an equation (section 2.1.4). The list of pre-defined rules is found in the IEEE 1815-1 document.

The following display has been selected to be in a tabular form.

Mapping between DNP3 and IEC 61850 Objects

3 Capabilities and Current Settings for Device Database (Outstation only)

The following tables identify the capabilities and current settings for each DNP3 data type. Details defining the data points available in the device are shown in part 5 of this Device Profile.

3.1 Binary Inputs **Static (Steady-State) Object Number: 1** **Event Object Number: 2**			
	Capabilities (leave tick-boxes blank if this data type is not supported)	**Current Value**	**If configurable list methods**
3.1.1 Static Variation reported when variation 0 requested or in response to Class polls:	☑ Variation 1 - packed format ☑ Variation 2 - with flag ☐ Based on point index (add column to table in part 5)	One	other (Web Browser)
3.1.2 Event Variation reported when variation 0 requested or in response to Class polls: *Note: The support for binary input events can be determined remotely using protocol object Group 0 Variation 237.*	☑ Variation 1 - without time ☑ Variation 2 - with absolute time ☑ Variation 3 - with relative time ☐ Based on point index (add column to table in part 5)	One	other (Web Browser)
3.1.3 Event reporting mode: *When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event. "All events" must be checked to be compliant.*	☑ Only most recent ☑ All events ☐ Based on point index (add column to table in part 5)	All events	
3.1.4 Binary Inputs included in Class 0 response:	☐ Always ☐ Never ☐ Only if point is assigned to a class ☑ Based on point index (add column to table in part 5)	Based on point index	other (Web Browser)
3.1.5 Binary Inputs Event Buffer Organization: *When event buffers are allocated per object group (see part 1.7.6), indicate the number of events that can be buffered for Binary Inputs. If event buffers are not allocated per object group then set "Fixed at 0".*	☑ Fixed at **1024** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Number of events = 1024	

3.3 Binary Output Status and Control Relay Output Block **Binary Output Status Object Number: 10** **Binary Output Event Object Number: 11** **CROB Object Number: 12** **Binary Output Command Event Object Number: 13**			
	Capabilities (leave tick-boxes blank if this data type is not supported)	**Current Value**	**If configurable list methods**
3.3.1 Minimum pulse time allowed with Trip, Close and Pulse On commands:	☑ Fixed at **0** ms (hardware may limit this further) ☑ Based on point index (add column to table in part 5)	Based on point index	
3.3.2 Maximum pulse time allowed with Trip, Close and Pulse On commands:	☑ Fixed at **2147483647** ms (hardware may limit this further ☑ Based on point index (add column to table in part 5)	Based on point index	

3.3.3 Binary Output Status included in Class 0 response:	☐ Always ☐ Never ☐ Only if point is assigned to a class ☑ Based on point index (add column to table in part 5)	Based on point index	
3.3.4 Reports Output Command Event Objects:	☑ Never ☐ Only upon a successful Control ☐ Upon all control attempts	Never	
3.3.5 Static Variation reported when variation 0 requested or in response to Class polls:	☐ Variation 1 - packed format ☑ Variation 2 - output status with flags ☐ Based on point index (add column to table in part 5)	Two	
3.3.6 Event Variation reported when variation 0 requested or in response to Class polls: *Note: The support for binary output events can be determined remotely using protocol object Group 0 Variation 222.*	☐ Variation 1 - status without time ☐ Variation 2 - status with time ☐ Based on point index (add column to table in part 5)		
3.3.7 Command Event Variation reported when variation 0 requested or in response to Class polls:	☐ Variation 1 - command status without time ☐ Variation 2 - command status with time ☐ Based on point index (add column to table in part 5)		
3.3.8 Event reporting mode: *When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.*	☐ Only most recent ☐ All events		
3.3.9 Command Event reporting mode: *When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.*	☐ Only most recent ☐ All events		other (Web Browser)
3.3.10 Maximum Time between Select and Operate:	☐ Not Applicable ☑ Fixed at **1** seconds ☐ Configurable, range to seconds ☐ Configurable, selectable from seconds ☐ Configurable, other, describe ☐ Variable, explain ☐ Based on point index (add column to table in part 5)	1 seconds	
3.3.11 Binary Outputs Event Buffer Organization: *When event buffers are allocated per object group (see part 1.7.6), indicate the number of events that can be buffered for Binary Outputs. If event buffers are not allocated per object group then set "Fixed at 0".*	☑ Fixed at **0** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Number of events = 0	
3.3.12 Binary Output Commands Event Buffer Organization: *When event buffers are allocated per object group (see part 1.7.6), indicate the number of events that can be buffered for Binary Output Commands. If event buffers are not allocated per object group then set "Fixed at 0".*	☑ Fixed at **0** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Number of events = 0	

3.4 Counters / Frozen Counters

Counter Group Number: 20
Frozen Counter Group Number: 21
Counter Event Group Number: 22
Frozen Counter Event Group Number: 23

	Capabilities (leave tick-boxes blank if this data type is not supported)	**Current Value**	**If configurable list methods**
3.4.1 Static Counter Variation reported when variation 0 requested or in response to Class polls:	☑ Variation 1 - 32-bit with flag ☑ Variation 2 - 16-bit with flag ☑ Variation 5 - 32-bit without flag ☑ Variation 6 - 16-bit without flag ☐ Based on point index (add column to table in part 5)	Five	

3.4.2 Counter Event Variation reported when variation 0 requested or in response to Class polls: *Note: The support for counter events can be determined remotely using protocol object Group 0 Variation 227.*	☐ Variation 1 - 32-bit with flag ☐ Variation 2 - 16-bit with flag ☐ Variation 5 - 32-bit with flag and time ☐ Variation 6 - 16-bit with flag and time ☑ Based on point index (add column to table in part 5)	Based on point index	
3.4.3 Counters included in Class 0 response:	☐ Always ☐ Never ☐ Only if point is assigned to a class ☑ Based on point index (add column to table in part 5)	Based on point index	other (Web Browser)
3.4.4 Counter Event reporting mode: *When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event. Only the most recent event is typically reported for Counters. When reporting only the most recent event the counter value returned in the response may be either the value at the time that the event is queued or it may be the value at the time of the response.*	☐ A: Only most recent (value at time of event) ☐ B: Only most recent (value at time of response) ☑ C: All events ☐ Based on point index (add column to table in part 5)	All events	
3.4.5 Static Frozen Counter Variation reported when variation 0 requested or in response to Class polls:	☑ Variation 1 - 32-bit with flag ☑ Variation 2 - 16-bit with flag ☐ Variation 5 - 32-bit with flag and time ☐ Variation 6 - 16-bit with flag and time ☑ Variation 9 - 32-bit without flag ☑ Variation 10 - 16-bit without flag ☐ Based on point index (add column to table in part 5)	One	
3.4.6 Frozen Counter Event Variation reported when variation 0 requested or in response to Class polls: *Note: The support for frozen counter events can be determined remotely using protocol object Group 0 Variation 225.*	☐ Variation 1 - 32-bit with flag ☐ Variation 2 - 16-bit with flag ☐ Variation 5 - 32-bit without flag ☐ Variation 6 - 16-bit without flag ☐ Based on point index (add column to table in part 5)		
3.4.7 Frozen Counters included in Class 0 response:	☐ Always ☐ Never ☐ Only if point is assigned to a class ☑ Based on point index (add column to table in part 5)		
3.4.8 Frozen Counter Event reporting mode: *When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event. All events are typically reported for Frozen Counters*	☐ Only most recent frozen value ☐ All frozen values ☐ Based on point index (add column to table in part 5)		
3.4.9 Counters Roll Over at:	☑ 16 Bits (65,535) ☑ 32 Bits (4,294,967,295) ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe ☑ Based on point index (add column to table in part 5)	Based on point index	
3.4.10 Counters frozen by means of:	☑ Master Request ☐ Freezes itself without concern for time of day ☐ Freezes itself and requires time of day ☐ Other, explain:	Master Request	
3.4.11 Counters Event Buffer Organization: *When event buffers are allocated per object group (see part 1.7.6), indicate the number of events that can be buffered for Counters. If event buffers are not allocated per object group then set "Fixed at 0".*	☑ Fixed at **1024** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Number of events = 1024	
3.4.12 Frozen Counters Event Buffer Organization: *When event buffers are allocated per object group (see part 1.7.6), indicate the number of events that can be buffered for Frozen Counters. If event buffers are not allocated per object group then set "Fixed at 0".*	☑ Fixed at **0** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Number of events = 0	

3.4.13 Reports counter events for change of value: *Indicate if counter events are created when the counter value changes.*	☐ Yes for all counters ☑ No for all counters ☐ Based on point index (add column to table in part 5)	No	

3.5 Analog Inputs **Static (Steady-State) Object Number: 30** **Event Object Number: 32** **Deadband Object Number: 34**			
	Capabilities (leave tick-boxes blank if this data type is not supported)	**Current Value**	**If configurable list methods**
3.5.1 Static Variation reported when variation 0 requested or in response to Class polls:	☑ Variation 1 - 32-bit with flag ☑ Variation 2 - 16-bit with flag ☑ Variation 3 - 32-bit without flag ☑ Variation 4 - 16-bit without flag ☐ Variation 5 - single-precision floating point with flag ☐ Variation 6 - double-precision floating point with flag ☐ Based on point index (add column to table in part 5)	One	other (Web Browser)
3.5.2 Event Variation reported when variation 0 requested or in response to Class polls: *Note: The support for analog input events can be determined remotely using protocol object Group 0 Variation 231.*	☑ Variation 1 - 32-bit without time ☑ Variation 2 - 16-bit without time ☐ Variation 3 - 32-bit with time ☐ Variation 4 - 16-bit with time ☐ Variation 5 - single-precision floating point w/o time ☐ Variation 6 - double-precision floating point w/o time ☐ Variation 7 - single-precision floating point with time ☐ Variation 8 - double-precision floating point with time ☐ Based on point index (add column to table in part 5)	One	
3.5.3 Event reporting mode: *When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event. Only the most recent event is typically reported for Analog Inputs. When reporting only the most recent event the analog value returned in the response may be either the value at the time that the event is queued or it may be the value at the time of the response.*	☐ A: Only most recent (value at time of event) ☐ B: Only most recent (value at time of response) ☑ C: All events ☐ Based on point index (add column to table in part 5)	All events	
3.5.4 Analog Inputs included in Class 0 response:	☐ Always ☐ Never ☐ Only if point is assigned to a class ☑ Based on point index (add column to table in part 5)	Based on point index	
3.5.5 How Deadbands are set:	☑ A. Global Fixed ☑ B. Configurable through DNP ☐ C. Configurable via other means ☐ D. Other, explain: ☐ Based on point index - column in part 5 specifies which of the options applies, B, C, or D	A	other (Web Browser)
3.5.6 Analog Deadband Algorithm: simple- just compares the difference from the previous reported value integrating- keeps track of the accumulated change other- indicating another algorithm	☑ Simple ☑ Integrating ☐ Other, explain: ☐ Based on point index (add column to table in part 5)	Simple	other (Web Browser)
3.5.7 Static Frozen Analog Input Variation reported when variation 0 requested or in response to Class polls:	☐ Variation 1 - 32-bit with flag ☐ Variation 2 - 16-bit with flag ☐ Variation 3 - 32-bit with time-of-freeze ☐ Variation 4 - 16-bit with time-of-freeze ☐ Variation 5 - 32-bit without flag ☐ Variation 6 - 16-bit without flag ☐ Variation 7 - single-precision floating point with flag ☐ Variation 8 - double-precision floating point with flag ☐ Based on point index (add column to table in part 5)		

3.5.8 Frozen Analog Input Event Variation reported when variation 0 requested or in response to Class polls: *Note: The support for frozen analog input events can be determined remotely using protocol object Group 0 Variation 230.*	☐ Variation 1 - 32-bit without time ☐ Variation 2 - 16-bit without time ☐ Variation 3 - 32-bit with time ☐ Variation 4 - 16-bit with time ☐ Variation 5 - single-precision floating point w/o time ☐ Variation 6 - double-precision floating point w/o time ☐ Variation 7 - single-precision floating point with time ☐ Variation 8 - double-precision floating point with time ☐ Based on point index (add column to table in part 5)		
3.5.9 Frozen Analog Inputs included in Class 0 response:	☐ Always ☑ Never ☐ Only if point is assigned to a class ☐ Based on point index (add column to table in part 5)	Never	
3.5.10 Frozen Analog Input Event reporting mode: *When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event. All events are typically reported for Frozen Analog Inputs.*	☐ Only most recent frozen value ☐ All frozen values ☐ Based on point index (add column to table in part 5)		
3.5.11 Analog Inputs Event Buffer Organization: *When event buffers are allocated per object group (see part 1.7.6), indicate the number of events that can be buffered for Analog Inputs. If event buffers are not allocated per object group then set "Fixed at 0".*	☑ Fixed at **1024** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Number of events = 1024	
3.5.12 Frozen Analog Inputs Event Buffer Organization: *When event buffers are allocated per object group (see part 1.7.6), indicate the number of events that can be buffered for Frozen Analog Inputs. If event buffers are not allocated per object group then set "Fixed at 0".*	☑ Fixed at **0** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Number of events = 0	

3.6 Analog Outputs and Analog Output Commands

Analog Output Status Group Number: 40
Analog Outputs Group Number: 41
Analog Output Events Group Number: 42
Analog Output Command Events Group Number: 43

	Capabilities (leave tick-boxes blank if this data type is not supported)	**Current Value**	**If configurable list methods**
3.6.1 Static Analog Output Status Variation reported when variation 0 requested or in response to Class polls:	☐ Variation 1 - 32-bit with flag ☑ Variation 2 - 16-bit with flag ☐ Variation 3 - single-precision floating point with flag ☐ Variation 4 - double-precision floating point with flag ☐ Based on point index (add column to table in part 5)	Two	
3.6.2 Analog Output Status included in Class 0 response:	☐ Always ☐ Never ☐ Only if point is assigned to a class ☑ Based on point index (add column to table in part 5)	Based on point index	
3.6.3 Reports Output Command Event Objects:	☑ Never ☐ Only upon a successful Control ☐ Upon all control attempts	Never	
3.6.4 Event Variation reported when variation 0 requested or in response to Class polls: *Note: The support for analog output events can be determined remotely using protocol object Group 0 Variation 219.*	☐ Variation 1 - 32-bit without time ☐ Variation 2 - 16-bit without time ☐ Variation 3 - 32-bit with time ☐ Variation 4 - 16-bit with time ☐ Variation 5 - single-precision floating point w/o time ☐ Variation 6 - double-precision floating point w/o time ☐ Variation 7 - single-precision floating point with time ☐ Variation 8 - double-precision floating point with time ☐ Based on point index (add column to table in part 5)		

3.6.5 Command Event Variation reported when variation 0 requested or in response to Class polls:	☐ Variation 1 - 32-bit without time ☐ Variation 2 - 16-bit without time ☐ Variation 3 - 32-bit with time ☐ Variation 4 - 16-bit with time ☐ Variation 5 - single-precision floating point w/o time ☐ Variation 6 - double-precision floating point w/o time ☐ Variation 7 - single-precision floating point with time ☐ Variation 8 - double-precision floating point with time ☐ Based on point index (add column to table in part 5)		
3.6.6 Event reporting mode: *When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.*	☐ Only most recent ☐ All events		
3.6.7 Command Event reporting mode: *When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.*	☐ Only most recent ☐ All events		
3.6.8 Maximum Time between Select and Operate:	☐ Not Applicable ☑ Fixed at **1** seconds ☐ Configurable, range to seconds ☐ Configurable, selectable from seconds ☐ Configurable, other, describe ☐ Variable, explain ☐ Based on point index (add column to table in part 5)	1 seconds	
3.6.9 Analog Outputs Event Buffer Organization: *When event buffers are allocated per object group (see part 1.7.6), indicate the number of events that can be buffered for Analog Outputs. If event buffers are not allocated per object group then set "Fixed at 0".*	☑ Fixed at **0** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Number of events = 0	
3.6.10 Analog Output Commands Event Buffer Organization: *When event buffers are allocated per object group (see part 1.7.6), indicate the number of events that can be buffered for Analog Output Commands. If event buffers are not allocated per object group then set "Fixed at 0".*	☑ Fixed at **0** ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe	Number of events = 0	

3.7 File Control **Object Number: 70**			
	Capabilities	**Current Value**	**If configurable list methods**
3.7.1 File Transfer Supported:	☐ Yes ☑ No (set 3.7.6 to "Fixed at 0" and do not complete other entries in section 3.7)		
3.7.2 File Authentication: *Indicates whether a valid authentication key must be obtained prior to open and delete requests.*	☐ Always ☐ Sometimes, explain ☐ Never		
3.7.3 File Append Mode: *Indicates if a file can be opened and appended to versus just overwritten.*	☐ Always ☐ Sometimes, explain ☐ Never		
3.7.4 Permissions Support: *Indicates the device is capable of using the indicated permissions.*	☐ Owner Read Allowed: 0x0100 ☐ Owner Write Allowed: 0x0080 ☐ Owner Execute Allowed: 0x0040 ☐ Group Read Allowed: 0x0020 ☐ Group Write Allowed: 0x0010 ☐ Group Execute Allowed: 0x0008 ☐ World Read Allowed: 0x0004 ☐ World Write Allowed: 0x0002 ☐ World Execute Allowed: 0x0001		

3.7.5 Multiple Blocks in a Fragment: *File data is transferred in a series of blocks of a maximum specified size. This indicates whether only a single block or multiple blocks will be sent in fragment.*	☐ Yes ☐ No		
3.7.6 Max number of Files Open at one time:	☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Configurable, other, describe		

3.10 Data Set Prototype **Object Number: 85** **Variation Number: 1**			
	Capabilities	**Current Value**	**If configurable list methods**

This version of the Device Profile has no requirement for describing Data Set Prototype capabilities and current settings. This page is intentionally left blank, existing as placeholder for future use.

3.11 Data Set Descriptor Contents and Characteristics **Object Number: 86** **Variation Numbers: 1 and 2**

This version of the Device Profile has no requirement for describing Data Set Descriptor capabilities and current settings. This page is intentionally left blank, existing as placeholder for future use.

4 Implementation Table

The following implementation table identifies which object groups and variations, function codes and qualifiers the device supports in both requests and responses. The *Request* columns identify all requests that may be sent by a Master, or all requests that must be parsed by an Outstation. The *Response* columns identify all responses that must be parsed by a Master, or all responses that may be sent by an Outstation.

DNP OBJECT GROUP & VARIATION			**REQUEST** **Master may issue** **Outstation must parse**		**RESPONSE** **Master must parse** **Outstation may issue**	
Object Group Number	**Variation Number**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
1	0	Binary Input - any variation	1*(read)*	06 *(no range, or all)*		
2	0	Binary Input Change Event - any variation	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*		
2	1	Binary Input Change Event - without time	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*	129 *(Response)*	17, 28 *(index)*
2	1	Binary Input Change Event - without time	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*	130 *(Unsol. Resp.)*	17, 28 *(index)*
2	2	Binary Input Change Event - with absolute time	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*	129 *(Response)*	17, 28 *(index)*
2	2	Binary Input Change Event - with absolute time	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*	130 *(Unsol. Resp.)*	17, 28 *(index)*
2	3	Binary Input Change Event - with relative time	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*	129 *(Response)*	17, 28 *(index)*
2	3	Binary Input Change Event - with relative time	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*	130 *(Unsol. Resp.)*	17, 28 *(index)*
10	0	Binary Output - any variation	1*(read)*	06 *(no range, or all)*		
10	2	Binary Output - Output status with flags			129 *(Response)*	00, 01 *(start-stop)*
12	1	Binary Output Command (CROB) - control relay output block	3*(select)*	17, 28 *(index)*	129 *(Response)*	echo of request
12	1	Binary Output Command (CROB) - control relay output block	4*(operate)*	17, 28 *(index)*	129 *(Response)*	echo of request
12	1	Binary Output Command (CROB) - control relay output block	5*(direct op.)*	17, 28 *(index)*	129 *(Response)*	echo of request

12	1	Binary Output Command (CROB) - control relay output block	6*(direct op, no ack)*	17, 28 *(index)*	129 *(Response)*	echo of request
20	0	Counter - any variation	1*(read)*	06 *(no range, or all)*		
20	0	Counter - any variation	7*(freeze)*	06 *(no range, or all)*		
20	0	Counter - any variation	8*(freeze, no ack)*	06 *(no range, or all)*		
20	0	Counter - any variation	9*(freeze & clear)*	06 *(no range, or all)*		
20	0	Counter - any variation	10*(frz & clr, no ack)*	06 *(no range, or all)*		
20	1	Counter - 32-bit with flag			129 *(Response)*	00, 01 *(start-stop)*
20	2	Counter - 16-bit with flag			129 *(Response)*	00, 01 *(start-stop)*
20	5	Counter - 32-bit without flag			129 *(Response)*	00, 01 *(start-stop)*
20	6	Counter - 16-bit without flag			129 *(Response)*	00, 01 *(start-stop)*
21	0	Frozen Counter - any variation	1*(read)*	06 *(no range, or all)*		
21	1	Frozen Counter - 32-bit with flag			129 *(Response)*	00, 01 *(start-stop)*
21	2	Frozen Counter - 16-bit with flag			129 *(Response)*	00, 01 *(start-stop)*
21	10	Frozen Counter - 16-bit without flag			129 *(Response)*	00, 01 *(start-stop)*
22	0	Counter Change Event - any variation	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*		
22	1	Counter Change Event - 32-bit with flag			129 *(Response)*	17, 28 *(index)*
22	1	Counter Change Event - 32-bit with flag			130 *(Unsol. Resp.)*	17, 28 *(index)*
22	2	Counter Change Event - 16-bit with flag			129 *(Response)*	17, 28 *(index)*
22	2	Counter Change Event - 16-bit with flag			130 *(Unsol. Resp.)*	17, 28 *(index)*
30	0	Analog Input - any variation	1*(read)*	06 *(no range, or all)*		
30	1	Analog Input - 32-bit with flag			129 *(Response)*	00, 01 *(start-stop)*
30	2	Analog Input - 16-bit with flag			129 *(Response)*	00, 01 *(start-stop)*
30	3	Analog Input - 32-bit without flag			129 *(Response)*	00, 01 *(start-stop)*
30	4	Analog Input - 16-bit without flag			129 *(Response)*	00, 01 *(start-stop)*
32	0	Analog Input Change Event - any variation	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*		
32	1	Analog Input Change Event - 32-bit without time			129 *(Response)*	17, 28 *(index)*
32	1	Analog Input Event – 32-bit without time			130 *(Unsol. Resp.)*	17, 28 *(index)*
32	2	Analog Input Change Event - 16-bit without time			129 *(Response)*	17, 28 *(index)*
32	2	Analog Input Change Event - 16-bit without time			130 *(Unsol. Resp.)*	17, 28 *(index)*
40	0	Analog Output Status - any variation	1*(read)*	06 *(no range, or all)*		
40	2	Analog Output Status - 16-bit with flag			129 *(Response)*	00, 01 *(start-stop)*
41	2	Analog Output Block - 16-bit	3*(select)*	17, 28 *(index)*	129 *(Response)*	echo of request
41	2	Analog Output Block - 16-bit	4*(operate)*	17, 28 *(index)*	129 *(Response)*	echo of request
41	2	Analog Output Block - 16-bit	5*(direct op.)*	17, 28 *(index)*	129 *(Response)*	echo of request
41	2	Analog Output Block - 16-bit	6*(direct op, no ack)*	17, 28 *(index)*	129 *(Response)*	echo of request
50	1	Time and Date - absolute time	2*(write)*	07 *(limited qty = 1)*		
51	1	Time and Date CTO - absolute time, synchronized			129 *(Response)*	07 *(limited qty = 1)*
51	1	Time and Date CTO - absolute time, synchronized			130 *(Unsol. Resp.)*	07 *(limited qty = 1)*
51	2	Time and Date CTO - absolute time, un-synchronized			129 *(Response)*	07 *(limited qty = 1)*
51	2	Time and Date CTO - absolute time, un-synchronized			130 *(Unsol. Resp.)*	07 *(limited qty = 1)*
52	1	Time Delay - coarse			129 *(Response)*	07 *(limited qty = 1)*
52	2	Time Delay - fine			129 *(Response)*	07 *(limited qty = 1)*
60	1	Class Objects - class 0 data	1*(read)*	06 *(no range, or all)*		
60	2	Class Objects - class 1 data	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*		
60	3	Class Objects - class 2 data	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*		
60	4	Class Objects - class 3 data	1*(read)*	06 *(no range, or all)*, 07, 08 *(limited qty)*		
80	1	Internal Indications - packed format	2*(write)*	00 *(start-stop)*		
21	9	Frozen Counter - 32-bit without flag			129 *(Response)*	00, 01 *(start-stop)*

5 Data Points List (outstation only)

This part of the Device Profile shows, for each data type, a table defining the data points available in the device or a description of how this information can be obtained if the database is configurable.

5.1 Definition of Binary Input Point List: *List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.* *Note: the number of binary inputs present in the device, and the maximum binary input index, are available remotely using object Group 0 Variations 239 and 238.*	☐ Fixed, list shown in table below ☑ Configurable (current list may be shown in table below) ☐ Other, explain:

Binary Input points list:

Point Index	Name	Event Class Assigned (1, 2, 3 or none)	Name for State when value is 0	Name for State when value is 1	Description	Included in Class 0 response (Always, Never, Class 1/2/3)

5.2 Definition of Double-bit Input Point List: *List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.* *Note: the number of double-bit inputs present in the device, and the maximum double-bit input index, are available remotely using object Group 0 Variations 236 and 235.*	☐ Fixed, list shown in table below ☐ Configurable (current list may be shown in table below) ☐ Other, explain:

Double-bit Input points list:

Point Index	Name	Event Class Assigned (1, 2, 3 or none)	Name for State when value is 0 (intermediate)	Name for State when value is 1 (off)	Name for State when value is 2 (on)	Name for State when value is 3 (indeterminate)	Description

5.3 Definition of Binary Output Status / Control Relay Output Block Points List: *List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.* *Note: the number of binary outputs present in the device, and the maximum binary output index, are available remotely using object Group 0 Variations 224 and 223.*	☐ Fixed, list shown in table below ☑ Configurable (current list may be shown in table below) ☐ Other, explain:

Binary Output Status and CROB points list:

		Supported Control Operations												Event Class Assigned (1,2,3 or none)					
Point Index	Name	Select/Operate	Direct Operate	Direct Operate - No Ack	Pulse On	Pulse Off	Latch On	Latch Off	Trip	Close	Count > 1	Cancel Currently Running Operation	Name for State when value is 0	Name for State when value is 1	Change	Command	Description	Minimum pulse time	Minimum pulse time	Included in Class 0 response (Always, Never, Class 1/2/3)

5.4 Definition of Counter / Frozen Counter Point List: *List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.* *Note: the number of counters present in the device, and the maximum counter index, are available remotely using object Group 0 Variations 229 and 228.*	☐ Fixed, list shown in table below ☑ Configurable (current list may be shown in table below) ☐ Other, explain:

Counter / Frozen Counter points list:

Point Index	Name	Event Class Assigned to Counter Events (1, 2, 3 or none)	Frozen Counter Exists (Yes or No)	Event Class Assigned to Frozen Counter Events (1, 2, 3 or none)	Description	Counter event variation when v0 requested	Conter included in Class 0 response (Always, Never, Class 1/2/3)	Counter rollover at

5.5 Definition of Analog Input Point List: *List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.* *Note: the number of analog inputs present in the device, and the maximum analog input index, are available remotely using object Group 0 Variations 233 and 232.*	☐ Fixed, list shown in table below ☑ Configurable (current list may be shown in table below) ☐ Other, explain:

Analog Input points list:

			Transmitted Value		Scaling				
Point Index	Name	Event Class Assigned (1, 2, 3 or none)	Min int / flt	Max int / flt	Multiplier	Offset	Units	Resolution	Description

5.6 Definition of Analog Output Status / Analog Output Block Point List: *List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.* *Note: the number of analog outputs present in the device, and the maximum analog output index, are available remotely using object Group 0 Variations 221 and 220.*	☐ Fixed, list shown in table below ☑ Configurable (current list may be shown in table below) ☐ Other, explain:

Analog Output points list:

		Supported Control Operations			Transmitted Value		Scaling				Event Class Assigned (1, 2, 3 or none)			
Point Index	Name	Select/Operate	Direct Operate	Direct Operate - No Ack	Min	Max	Min	Max	Units	Resolution	Change	Command	Description	Included in Class 0 response (Always, Never, Class 1/2/3)

5.7 Definition of File Names that may be read or written:	☐ Fixed, list shown in table below ☐ Configurable (current list may be shown in table below) ☐ Other, explain:

Sequential Files list:

		Authentication Required for:			
File Name	Event Class Assigned (1, 2, 3 or none)	Read	Write	Delete	Description

5.8 Definition of Octet String and Extended Octet String Point List: *List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.*	☐ Fixed, list shown in table below ☐ Configurable (current list may be shown in table below) ☐ Other, explain:

Octet String and Extended Octet String points list:

Point Index	Name	Event Class Assigned (1, 2, 3 or none)	Group Number used to transport the object	Description

5.9 Definition of Virtual Terminal Port Numbers: *List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.*	☐ Fixed, list shown in table below ☐ Configurable (current list may be shown in table below) ☐ Other, explain:

Ports list:

Virtual Port Number (Point Index)	Name	Event Class Assigned (1, 2, 3 or none)	Description

5.10 Definition of Data Set Prototypes: *List of all data set prototypes. The following table is repeated for each Data Set Prototype defined.* *Note: the number of data set prototypes known to the device are available remotely using object Group 0 Variations 212 and 213.*	☐ Fixed, list shown in table below ☐ Configurable (current list may be shown in table below) ☐ Other, explain:

5.11 Definition of Data Set Descriptors: *List of all data set descriptors. The following table is repeated for each Data Set Descriptor defined.* *Note: the number of data sets known to the device are available remotely using object Group 0 Variations 214 and 215.*	☐ Fixed, list shown in table below ☐ Configurable (current list may be shown in table below) ☐ Other, explain:

5.12 Data Set Descriptors - Point Index Attributes

The following table is optional and correlates data set elements to point indexes of standard DNP3 Data Objects. The element number below refers to the position in the present value object (object 87) or event (object 88) data set and will not match the element number in the data set descriptor or data set prototype tables above.

---------- End of Device Profile for Reference Device ----------

---------- End of Complete Device Profile ----------