Hadron Xtorm
DNP3 Client
Device Profile Document

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altus

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DEVICE PROFILE REVISION HISTORY

Date	Revision[1]	Reason for change	Edited by
11/02/2015	A	First edition.	Eduardo Bortolini

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[1] *Revision of the Device Profile Document is indicated by a letter incremented with each new release. The most recent revision should match the "Device Profile Document Revision" (item 1.1.6) in the Current Device Settings Table.*

Contents

Vendor Name: Altus Sistemas de Automação
Device Name: Hadron Xtorm

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 used for 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 section 1.6.8 of the Device Profile (Maximum error in the time that the Master issues freeze requests) where this 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 should be 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 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 methods 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 this document is used to show the current value of each parameter, the "Current Value" column applies to a single connection between a master and outstation. If the device has multiple or backup connections to other DNP devices that you wish to show in the Device Profile Document, see clause 14.8.3.2 "ReferenceDevice and AuxillaryInfo" of the DNP3 Specification or duplicate the entire Device Profile Document for each communication link to a logical or physical DNP3 Device.

Vendor Name: Altus Sistemas de Automação

Device Name: Hadron Xtorm

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	
1.1.2 Vendor Name: *The name of the organization producing the device.*			Altus Sistemas de Automação	
1.1.3 Device Name: *The model and name of the device, sufficient to distinguish it from any other device from the same organization.*			Hadron Xtorm	
1.1.4 Device manufacturer's hardware version string:			N/A	
1.1.5 Device manufacturer's software version string:			N/A	
1.1.6 Device Profile Document Revision: *Revision of the Device Profile Document is indicated by a letter incremented with each new release. This should match the latest version shown in the Revision History at the beginning of this document.*			A	
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.*	Requests ☐ None ■ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4	Responses ☐ None ■ Level 1 ■ Level 2 ☐ Level 3 ☐ Level 4	Level 1	

1.1 **DEVICE IDENTIFICATION**	**Capabilities**	**Current Value**	**If configurable, list methods**
1.1.8 Supported Function Blocks: .	☐ Self-Address Reservation ☐ Object 0 – attribute objects ☐ Data Sets ☐ File Transfer ☐ Virtual Terminal ☐ Mapping to IEC 61850 Object Models defined in a DNP3 XML file ☐ Function code 31, activate configuration		
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.*	Supports all features of level 1 and some features of higher levels: Binary Input (static and events), Binary Output (static), Double-bit Binary Input (static and events), Counter and Frozen Counter events with time, Analog Input and Output with single precision floating point, Time synchronization.		
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 MasterTool Xtorm ☐ 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 _____	Software MasterTool Xtorm	

1.1 DEVICE IDENTIFICATION	Capabilities	Current Value	If configurable, list methods
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 conf. values ☐ ☐ _____*.xml _____ * The Complete Device Profile Document contains the capabilities, Current Value, and configurable methods columns. * The Device Profile Capabilities contains only the capabilities and configurable methods columns. * The Device Profile Config. Values contains only the Current Value column.	N/A	
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 conf. values ☐ ☐ _____*.xml _____ * The Complete Device Profile Document contains the capabilities, Current Value, and configurable methods columns. * The Device Profile Capabilities contains only the capabilities and configurable methods columns. * The Device Profile Config. Values contains only the Current Value column.	N/A	
1.1.13 Connections Supported:	☐ Serial ☑ IP Networking (complete section 1.3) ☐ Other, explain _____	IP Networking	

1.3 **IP NETWORKING**	**Capabilities**	**Current Value**	**If configurable, list methods**
1.3.1 Port Name *Name used to reference the communication port defined in this section.*	■ NET1 ■ NET2 ■ NET3 ■ NET4 ■ NET5 ■ NET6		Software MasterTool Xtorm
1.3.2 Type of End Point:	■ TCP Initiating (Master Only) ☐ TCP Listening (Outstation Only) ☐ TCP Dual (required for Masters) ☐ UDP Datagram (required)		
1.3.3 IP Address of this Device:			Software MasterTool Xtorm
1.3.4 Subnet Mask:			Software MasterTool Xtorm
1.3.5 Gateway IP Address:			Software MasterTool Xtorm
1.3.6 Accepts TCP Connections or UDP Datagrams from:	☐ Allows all (show as *.*.*.* in) ☐ Limits based on an 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 validation, explain_____	N/A	
1.3.7 IP Address(es) from which TCP Connections or UDP Datagrams are accepted:		N/A	
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 configurable for Masters and recommended to be configurable for Outstations.*	■ Not Applicable (Master w/o dual end point) ☐ Fixed at 20,000 ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____	N/A	

1.3 IP NETWORKING	Capabilities	Current Value	If configurable, list methods
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 0 to 65535 ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____	20000	Software MasterTool Xtorm
1.3.10 TCP Keep-alive timer: *The time period for the keep-alive timer on active TCP connections.*	☐ Fixed at _____ms ■ Configurable, range 1 to 60 s ☐ Configurable, selectable from _,_,_ ms ☐ Configurable, other, describe_____	10	Software MasterTool Xtorm
1.3.11 Local UDP port: *Local UDP port for sending and/or receiving UDP datagrams. Master may let system choose an available port. Outstation must use one that is known by the master.*	☐ Fixed at 20,000 ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____ ☐ Let system choose (Master only)	N/A	
1.3.12 Destination UDP port for DNP3 Requests (Master Only):		N/A	
1.3.13 Destination UDP port for initial unsolicited null responses (UDP only Outstations): *For a UDP only Outstation, the destination UDP port for sending initial unsolicited Null response*	☐ None ☐ Fixed at 20,000 ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____	N/A	
1.3.14 Destination UDP port for responses: *For a UDP only Outstation, the destination UDP port for sending all responses other than initial unsolicited Null Response.*	☐ None ☐ Fixed at 20,000 ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____ ☐ Use source port number	N/A	
1.3.15 Multiple outstation connections (Masters only): *Master only. Indicates whether multiple outstation connections are supported.*	☐ Supports multiple outstations (Masters only)	N/A	

1.3 IP NETWORKING	Capabilities	Current Value	If configurable, list methods
1.3.16 Multiple master connections (Outstations Only): *Outstation 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	N/A	
1.3.17 Time synchronization support:	◼ DNP3 LAN procedure (function code 24) ◼ DNP3 Write Time (not recommended over LAN) ☐ Other, ☐ Not Supported	N/A	Software MasterTool Xtorm

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	Software MasterTool Xtorm
1.4.2 DNP3 Source Address Validation: *Indicates whether the device will filter out messages 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, one address allowed	Software MasterTool Xtorm
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	Software MasterTool Xtorm
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 disable the feature if supported.*	☐ Yes (only allowed if configurable) ☑ No		
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).*	☑ Always ☑ Sometimes, only for multi-frame fragments ☑ Never	Never	Software MasterTool Xtorm
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 1 to 86400 s ☐ Configurable, selectable from _,_,_ ms ☐ Configurable, other, describe_____ ☐ Variable, explain _____	1	Software MasterTool Xtorm

1.4 LINK LAYER	Capabilities	Current Value	If configurable, list methods
1.4.7 Maximum Data Link Retries: *The number of times the device will retransmit a frame that requests Link Layer confirmation.*	☐ Never Retries ☐ Fixed at _____ ■ Configurable, range 0 to 10 ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____	0 Note: This value should be changed only when communi-cating with non-LAN outstations.	Software MasterTool Xtorm
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 length field 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.* • *Outstations must provide a setting less than or equal to 2048.*	■ Fixed at 249 ☐ Configurable, range _____to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____	249	
1.5.2 Maximum number of octets Transmitted in an Application Layer Fragment containing File Transfer:	☐ Fixed at _____ ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe _____	N/A	
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.* • *Outstations must provide a setting greater than or equal to 249.*	■ Fixed at 2048 ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____	2048	
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 _____		
1.5.5 Maximum number of objects allowed in a single control request for CROB (group 12):	■ Fixed at 1 ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____ ☐ Variable, explain _____	1	
1.5.6 Maximum number of objects allowed in a single control request for Analog Outputs (group 41):	■ Fixed at 1 ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____ ☐ Variable, explain _____	1	

1.5	**APPLICATION LAYER**	**Capabilities**	**Current Value**	**If configurable, list methods**
1.5.7	Maximum number of objects allowed in a single control request for Data Sets (groups 85,86,87):	■ Fixed at 0 ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____ ☐ Variable, explain _____		
1.5.8	Supports mixing object groups (AOBs, CROBs and Data Sets) in the same control request:	☐ Not applicable – controls are not supported ☐ Yes ■ No		

1.6 FILL OUT THE FOLLOWING ITEMS FOR MASTERS ONLY	Capabilities	Current Value	If configurable, list methods
1.6.1 Timeout waiting for Complete Application Layer Response(ms): *Timeout on Master if all fragments of a response message are not received in the specified time.*	☐ None ☐ Fixed at_____ms ■ Configurable, range 1 to 86400 s ☐ Configurable, selectable from ___,___,___ms ☐ Configurable, other, describe_____ ☐ Variable, explain _____	10	Software MasterTool Xtorm
1.6.2 Maximum Application Layer Retries for Request Messages: *The number of times a Master will retransmit an application layer request message if a response is not received. This parameter must never cause a Master to retransmit control or time sync messages. Outstations should never transmit retries.*	■ None (required) ☐ Fixed at_____ ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from ___,___,___ ☐ Configurable, other, describe_____ ☐ Variable, explain _____		
1.6.3 Incremental Timeout waiting for First or Next Fragment of an Application Layer Response:	■ None ☐ Fixed at_____ms ☐ Configurable, range _____ to _____ms ☐ Configurable, selectable from ___,___,___ms ☐ Configurable, other, describe_____ ☐ Variable, explain _____		
1.6.4 Issuing controls to off-line devices: *Indicates if the Master issues control requests to devices that are thought to be off-line (i.e. the Master has not seen responses to previous Master requests).*	☐ Not applicable – controls are not supported ☐ Yes ■ No		
1.6.5 Issuing controls to off-scan devices: *Indicates if the Master issues control requests to devices that are currently off-scan (i.e. the Master has been configured not to issue poll requests to the device).*	☐ Not applicable – controls are not supported ☐■ Yes ☐ No		

1.6	FILL OUT THE FOLLOWING ITEMS FOR MASTERS ONLY	Capabilities	Current Value	If configurable, list methods
1.6.6	Maximum Application Layer Retries for Control Select Messages (same sequence number): *Indicates the number of times a Master will retransmit an application layer control select request message if a response is not received – using the same message sequence number.*	■ None (required) ☐ Fixed at_____ ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from ___,___,___ ☐ Configurable, other, describe_____ ☐ Variable, explain _____		
1.6.7	Maximum Application Layer Retries for Control Select Messages (new sequence number): *Indicates the number of times a Master will retransmit an application layer control select request message if a response is not received – using a new message sequence number.*	■ None (required) ☐ Fixed at_____ ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from ___,___,___ ☐ Configurable, other, describe_____ ☐ Variable, explain _____		
1.6.8	Maximum error in the time that the Master issues freeze requests: *If the Master is scheduled to issue freeze requests at a specific time, what is the maximum error in the time that the Master may actually issue a request?*		N/A	
1.6.9	Maximum error in the time that the Master schedules repetitive freeze requests: *If the Master is scheduled to issue freeze requests at a regular interval, what is the maximum error in the time interval that the Master may actually issue a request? (i.e. how early / late could the request actually be issued)*		N/A	
1.6.10	Scheduled actions that may affect the accuracy of freeze requests: *Indicates if the Master's accuracy of issuing freeze requests may be affected by other scheduled operations such as poll requests or control requests*	☐ Freeze time may be affected by Poll requests ■ Freeze time may be affected by Control requests		

1.6 FILL OUT THE FOLLOWING ITEMS FOR MASTERS ONLY	Capabilities	Current Value	If configurable, list methods
1.6.11 Master's algorithm for scheduling request operations: *Describe the Master's algorithm for determination of which activity is performed when more than one is due at the same moment. Discuss precedence and priorities for activities such as time synchronization, poll requests, control requests and freeze requests.*	FIFO (First In, First Out) algorithm implemented in each outstation for poll requests. So, each one of declared outstations can perform one request at the same moment. For control and freeze requests, the FIFO scheduler is suspended and the request is proceeded. When it ends, the scheduler is released. Each outstation supports only one of this kind of request per time.	Integrity poll (ms): 1000 Class 1(ms): 1000 Class 2(ms): 1000 Class 3(ms): 1000	Software MasterTool Xtorm

1.12 SECURITY PARAMETERS	Capabilities	Current Value	If configurable, list methods
1.12.1 DNP3 device support for secure authentication: *The support for secure authentication is optional in DNP3 devices. Indicate here if the device supports secure authentication.* *If the device does not support secure authentication then ignore the rest of this section.* *If the device does support secure authentication then specify the version(s) that are supported in the device. The version number is an integer value defined in the DNP3 Specification. The Secure Authentication procedure defined in IEEE 1815-2010 is version 2. The Secure Authentication procedure defined in IEEE 1815-2012 is version 5.*	■ Secure Authentication not supported If Secure Authentication is supported, what Version(s) are supported: ☐ Fixed at _____ ☐ Configurable, selectable from _,_,_	N/A	
1.12.2 Maximum number of users: *The secure authentication algorithm provides support for multiple users. The device must support details for each user (update keys, session keys, etc). A user is identified by a 16-bit user number, allowing a maximum of 65535 users. Devices are not mandated to support this number of potential users. Indicate here the actual limit to the number of simultaneous users that can be supported.*	Maximum number of users supported: ___	N/A	
1.12.3 Security message response timeout: *Authentication of critical messages may involve additional message exchanges (challenges and responses) which can require an extension to the normal DNP3 message response timeout. This timeout specifies an additional time to be used when the extra security transactions are involved. The maximum allowable timeout extension should not exceed 120 seconds.*	☐ Fixed at _____ ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____	N/A	

1.12 **SECURITY PARAMETERS**	**Capabilities**	**Current Value**	**If configurable, list methods**
1.12.4 Aggressive mode of operation (receive): *DNP3 devices may (optionally) accept "aggressive" mode requests, where challenge data used for authentication is appended to a critical message rather than needing to be solicited via a separate message exchange.*		○ *Yes -* Accepts aggressive mode requests ● *No – Does not* accept aggressive mode requests	
1.12.5 Aggressive mode of operation (issuing): *DNP3 devices must support the issuing of "aggressive" mode of operation, where challenge data used for authentication is appended to a critical message rather than needing to be solicited via a separate message exchange. Specific instances of devices may have the use of aggressive mode switched off.*		○ *Yes -* Issues aggressive mode requests ● *No – Does not* issue aggressive mode requests	
1.12.6 Session Key change interval: *To counter an attack that compromises the session key, the session key is changed at regular intervals. The maximum interval is 2 hours. Outstation devices invalidate the current set of session keys if they have not been changed by the master station after a period of twice this configured value.* *To accommodate systems with infrequent communications, this change interval can be disabled and just the session key change message count used (see 1.12.7)*	☐ Can be disabled When enabled: ☐ Configurable, range _____ to _____seconds	N/A	
1.12.7 Session Key change message count: *In addition to changing the session key at regular intervals, the key shall also be changed after a specified number of messages have been exchanged. The maximum allowable value for this message count is 10,000*	☐ Configurable, range _____ to _____	N/A	

1.12 **SECURITY PARAMETERS**	**Capabilities**	**Current Value**	**If configurable, list methods**
1.12.8 Maximum error count: *To assist in countering denial of service attacks, a DNP3 device shall stop replying with error codes after a number of successive authentication failures. This error count has a maximum value of 10. Setting the error count to zero inhibits all error messages.*	☐ Configurable, range _____ to _____	N/A	
1.12.9 MAC algorithm requested in a challenge exchange: *Part of the authentication message is hashed using an MAC algorithm. Secure Authentication version 2 specifies that DNP3 devices must support SHA-1 and may optionally support SHA-256 for this hashing process. Secure Authentication version 5 specifies that SHA-256 is the default. The output of the MAC algorithm is truncated (the resulting length dependant on the media being used).*	☐ HMAC-SHA-1 (truncated to the leftmost 4 octets) ☐ HMAC-SHA-1 (truncated to the leftmost 8 octets) ☐ HMAC-SHA-1 (truncated to the leftmost 10 octets) ☐ HMAC-SHA-256 (truncated to the leftmost 8 octets) ☐ HMAC-SHA-256 (truncated to the leftmost 16 octets) ☐ AES-GMAC ☐ Other, explain _____	N/A	
1.12.10 Key-wrap algorithm to encrypt session keys: *During the update of a session key, the key is encrypted using AES-128 or optionally using other algorithms.*	☐ AES-128 ☐ AES-256 ☐ RSAES-OAEP-1024 / SHA-1 ☐ RSAES-OAEP-2048 / SHA-256 ☐ RSAES-OAEP-3072 / SHA-256 ☐ Other, explain _____	N/A	

Vendor Name: Altus Sistemas de Automação
Device Name: Hadron Xtorm

1.12 SECURITY PARAMETERS	Capabilities	Current Value	If configurable, list methods
1.12.11 Cipher Suites used with DNP implementations using TLS: *When TLS is supported, DNP3 Secure Authentication mandates the support of TLS_RSA_WITH_AES_128_SHA. The specification has a number of recommended cipher suite combinations. Indicate the supported Cipher Suites for implementations using TLS.*	☐ Not relevant – TLS is not used ☐ TLS_RSA encrypted with AES128 ☐ TLS_RSA encrypted with RC4_128 ☐ TLS_RSA encrypted with 3DES_EDE_CBC ☐ TLS_DH, signed with DSS, encrypted with 3DES_EDE_CBC ☐ TLS_DH, signed with RSA, encrypted with 3DES_EDE_CBC ☐ TLS_DHE, signed with DSS, encrypted with 3DES_EDE_CBC ☐ TLS_DHE, signed with RSA, encrypted with 3DES_EDE_CBC ☐ TLS_DH, signed with DSS, encrypted with AES128 ☐ TLS_DH, signed with DSS, encrypted with AES256 ☐ TLS_DH encrypted with AES128 ☐ TLS_DH encrypted with AES256 ☐ Other, explain _____	N/A	
1.12.12 Change cipher request timeout: *Implementations using TLS shall terminate the connection if a response to a change cipher request is not seen within this timeout period.*	☐ Not relevant – TLS is not used ☐ Fixed at _____ ☐ Configurable, range _____ to _____ ☐ Configurable, selectable from _,_,_ ☐ Configurable, other, describe_____	N/A	
1.12.13 Number of Certificate Authorities supported: *Implementations using TLS shall support at least 4 Certificate Authorities. Indicate the number supported.*		N/A	
1.12.14 Certificate Revocation check time: *Implementations using TLS shall evaluate Certificate Revocation Lists on a periodic basis, terminating a connection if a certificate is revoked.*	☐ Not relevant – TLS is not used ☐ Fixed at _____ hours ☐ Configurable, range _____ to _____hours ☐ Configurable, selectable from _,_,_hours ☐ Configurable, other, describe_____	N/A	

1.12 SECURITY PARAMETERS	Capabilities	Current Value	If configurable, list methods
1.12.15 Additional critical function codes: *The DNP3 specification defines those messages with specific function codes that are critical and must be used as part of a secure authentication message exchange. Messages with other function codes are optional and changes to this list should be noted here.* *Note: Secure Authentication version 5 defines additional functions as critical that were not considered critical in version 2. These are shown in the next column annotated with "V2 only".*	Additional function codes that are to be considered as "critical": ☐ 0 (Confirm) ☐ 1 (Read) ☐ 7 (Immediate freeze) ☐ 8 (Immediate freeze – no ack) ☐ 9 (Freeze-and-clear) ☐ 10 (Freeze-and-clear – no ack) ☐ 11 (Freeze-at-time) ☐ 12 (Freeze-at-time – no ack) ☐ 22 (Assign Class) ☐ 23 (Delay Measurement) ☐ 25 (Open File) – V2 only ☐ 26 (Close File) – V2 only ☐ 27 (Delete File) – V2 only ☐ 28 (Get File Info) – V2 only ☐ 30 (Abort File) – V2 only ☐ 129 (Response) ☐ 130 (Unsolicited Response)	N/A	
1.12.16 Other critical fragments: *Other critical transactions can be defined and should be detailed here. Examples could be based on time (for example: the first transaction after a communications session is established). Other examples could be based on specific data objects (for example: the reading of specific data points).*	Describe any other critical fragment exchanges:	N/A	
1.12.17 Support for remote update key changes: *Devices implementing secure authentication version 5 or later have the option to support remote update key changes. If remote update key change is supported then the procedure using symmetric cryptography is mandatory. Additional support for the procedure using asymmetric (public key) cryptography is optional.*	☐ Remote update key change by symmetric cryptography ☐ Remote update key change by asymmetric cryptography	N/A	

3 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.

NOTE	The implementation table must list all functionality required by the device whether Master or Outstation as defined within the DNP3 IED Conformance Test Procedures. Any functionality beyond the highest subset level supported is indicated by highlighted rows. Any Object Groups not provided by an outstation or not processed by a Master are indicated by ~~strikethrough~~ (note these Object Groups will still be parsed).

DNP OBJECT GROUP & VARIATION			REQUEST – Master can issue		RESPONSE – Master parses	
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)	00, 01 (start-stop) 06 (no range, or all)		
1	1	Binary Input – Packed Format	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
1	2	Binary Input - With flags	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
2	0	Binary Input Event - Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
2	1	Binary Input Event - Without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
2	2	Binary Input Event – With absolute time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
2	3	Binary Input Event - With relative time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
3	0	Double-bit Binary Input – Any Variation	1 (read)	00, 01 (start-stop) 06 (no range, or all)		
3	1	Double-bit Binary Input – Packed Format	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
3	2	Double-bit Binary Input - With flags	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
4	0	Double-bit Binary Input Event - Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
4	1	Double-bit Binary Input Event - Without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
4	2	Double-bit Binary Input Event - With absolute time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)

DNP OBJECT GROUP & VARIATION			REQUEST Master can issue		RESPONSE Master parses	
Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
4	3	Double-bit Binary Input Event - With relative time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
10	0	Binary Output - Any Variation	1 (read)	00, 01 (start-stop) 06 (no range, or all)		
10	1	Binary Output – Packed Format	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
10	2	Binary Output - Output status with flags	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
12	1	Binary Command - Control relay output block (CROB)	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	17, 28 (index)	129 (response)	echo of request
20	0	Counter - Any Variation	1 (read) 7 (freeze) 8 (freeze noack) 9 (freeze clear) 10 (frz. cl. noack)	00, 01 (start-stop) 06 (no range, or all)		
20	1	Counter - 32-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
20	2	Counter - 16-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
20	5	Counter - 32-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
20	6	Counter - 16-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
21	0	Frozen Counter - Any Variation	1 (read)	00, 01 (start-stop) 06 (no range, or all)		
21	1	Frozen Counter - 32-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
21	2	Frozen Counter -16-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
21	9	Frozen Counter - 32-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
21	10	Frozen Counter - 16-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
22	0	Counter Event - Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
22	1	Counter Event - 32-bit with flag	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
22	2	Counter Event - 16-bit with flag	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
22	5	Counter Event - 32-bit with flag and time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
22	6	Counter Event - 16-bit with flag and time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
23	0	Frozen Counter Event – Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
23	1	Frozen Counter Event - 32-bit with flag	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. Resp)	17,28 (index)

DNP OBJECT GROUP & VARIATION			REQUEST		RESPONSE	
			Master can issue		Master parses	
Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
23	2	Frozen Counter Event - 16-bit with flag	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17,28 (index)
23	5	Frozen Counter Event - 32-bit with flag and time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
23	6	Frozen Counter Event - 16-bit with flag and time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
30	0	Analog Input - Any Variation	1 (read)	00, 01 (start-stop) 06 (no range, or all)		
30	1	Analog Input - 32-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	2	Analog Input - 16-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	3	Analog Input - 32-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	4	Analog Input - 16-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	5	Analog Input – Single-prec flt-pt with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
32	0	Analog Input Event - Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
32	1	Analog Input Event - 32-bit without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	2	Analog Input Event - 16-bit without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	3	Analog Input Event - 32-bit with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	4	Analog Input Event - 16-bit with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	5	Analog Input Event – Single-prec flt-pt without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	7	Analog Input Event – Single-prec flt-pt with Time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
40	0	Analog Output Status – Any Variation	1 (read)	00, 01 (start-stop) 06 (no range, or all)		
40	1	Analog Output Status – 32-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
40	2	Analog Output Status – 16-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
40	3	Analog Output Status – Single-prec flt-pt with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
41	1	Analog Output– 32-bit	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	17, 28 (index)	129 (response)	echo of request
41	2	Analog Output– 16-bit	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	17, 28 (index)	129 (response)	echo of request

Vendor Name: Altus Sistemas de Automação

Device Name: Hadron Xtorm

DNP OBJECT GROUP & VARIATION			REQUEST — Master can issue		RESPONSE — Master parses	
Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
41	3	Analog Output– Single-prec flt-pt	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	17, 28 (index)	129 (response)	echo of request
50	1	Time and Date – Absolute Time				
			2 (write)	07 (limited qty = 1)		
50	3	Time and Date – Absolute time at last recorded time	2 (write)	07 (limited qty)		
51	1	Time and Date CTO – Absolute time, synchronized			129 (response) 130 (unsol. resp)	07 (limited qty) (qty = 1)
51	2	Time and Date CTO – Absolute time, unsynchronized			129 (response) 130 (unsol. resp)	07 (limited qty) (qty = 1)
52	1	Time Delay - Coarse			129 (response)	07 (limited qty) (qty = 1)
52	2	Time Delay - Fine			129 (response)	07 (limited qty) (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) (see note 2)	00 (start-stop) index=4 or 7		
No Object (function code only)			13 (cold restart)			
No Object (function code only)			23 (delay meas.)			
No Object (function code only)			24 (record current time)			