Kepware Technologies

Differences Between 4x and 5x for DNP Drivers

Table of Contents

1. General

The purpose of this document is to describe behavioral differences between the KEPServerEX v4 DNP Master drivers and the KEPServerEX v5 DNP Master drivers.

Behavior	4x	5x	Description
.Value, .Timestamp, and .Flags Tag Quality When No Data	Bad (Out of Service)	Bad	If the slave does not return the value, timestamp, or flags data for the point, the tag quality will be set to Bad.
Multiple Devices Per Serial Channel	Available	Available	Improved multi-threaded communications.
Multiple Devices Per Ethernet Channel	Not Available	Available	Enhanced with multi-threaded communications.
Device Profile Documents	Not Available	Available	Included in both driver help files.

2. Changes in Channel Properties

2.1 DNP Master Ethernet

Item	4x	5x	Notes
Page	DNP Master Timeout Setup	Timing	
Property	DNP Connection Timeout (sec)	Connect Timeout (sec)	
Property	DNP Channel Timeout (sec)	Response Timeout (ms)	The timer will start after a request has been transmitted. This changed from seconds to milliseconds.
Page	DNP Master Setup	Communications	
Property	DNP Master Node Address	No longer a channel property.	The 16-bit master address was moved to device "Communications".
Property	DNP Slave IP Address	Destination IP	
Property	DNP Slave Port	Destination Port	
Property	DNP Connection	Protocol	Users have a choice between TCP and UDP.
Property	UDP Listener Port	Source Port	This is only available if the protocol is UDP.

2.2 DNP Master Serial

Channel settings remain the same because it is a server property page. Ethernet Encapsulation is also handled as a server property page.

3. Changes in Device Properties

Changes made to the Device Properties are the same for both DNP Master Ethernet and DNP Master Serial.

Item	4x	5x	Notes
Page	General	General	The page name did not change, but the Device ID property is no longer used.
Property	Device ID	Moved to device "Communications" as Slave Address.	This is the 16-bit DNP address for the slave.
Property	Channel Property: DNP Master Node Address	Moved to device "Communications" as Master Address	In 5x, this is the 16-bit DNP address for the master. In 4x, it was a channel property.
Page	DNP Slave Configuration	Moved to "Class Polling" and device "Communications"	The polling properties were moved to "Class Polling". The timeout property was moved to device "Communications".
Property	Event Poll Interval	Event Class 1 Poll	Now in "Class Polling".

		(seconds) Class 1	Interval (sec)	
Property	Event Poll Interval (seconds) Class 2	Event Class 2 Poll Interval (sec)	Now in "Class Polling".
Property	Event Poll Interval (seconds) Class 3	Event Class 3 Poll Interval (sec)	Now in "Class Polling".
Property	Integrity Poll Interval (seconds)	Integrity Poll Interval (sec)	The Device Wizard breaks the event poll intervals on to a separate page.
Property	DNP Command Timeout (seconds)	Request Timeout (ms)	This property was moved to the Communications section of device "Communications". The timer will start as soon as the request attempts to transmit. It has changed from seconds to milliseconds.
Property		Issue Integrity Poll On: Checkbox: Restart	This checkbox is new in 5x. It should always be checked if there are .Value tags in the project. When unchecked, no integrity polling will occur when the master restarts. It can be used if the user is only using .Explicit tags in the project.
Property		Issue Integrity Poll On: Checkbox: Slave Online	This checkbox is new in 5x. When there are .Value tags, the user may want an integrity poll to be issued when the master detects that the slave has come back online. This is useful in a multi-device channel scenario.
Property		Issue Integrity Poll On: Checkbox: Buffer Overflow	This checkbox is new in 5x. If checked and a response from the slave includes an IIN byte with the buffer overflow bit set, an integrity poll will be issued. If unchecked, the buffer overflow bit set in a response IIN is ignored.
Page	DNP Unsolicited Messaging	Unsolicited	
Property	Class 1 Unsolicited Messages	Unsolicited Mode Class 1	
Property	Class 2 Unsolicited Messages	Unsolicited Mode Class 2	
Property	Class 3 Unsolicited Messages	Unsolicited Mode Class 3	
Property	Radio button options: Enable, Disable, No Action	Combo box options: Enable, Disable, Automatic	The default setting is Automatic, and it allows the slave to decide if it wants to send unsolicited messages.
Property	Checkbox: Disable unsolicited messages during session initialization	Checkbox: Disable unsolicited messages during startup	This property is not available if all of the class unsolicited modes are disabled or if any of them are Automatic. Automatic means that nothing will be sent to the device for the class. When checked, this option will disable the messages for that class. Therefore, disabling on startup is not allowed if any of the classes use the Automatic mode.
Page	DNP Event Buffering	Event Playback	
Property	Max events per tag	Max Events Per Point	The buffer is kept per point, not per tag. The maximum allowed Max Events Per Point changed from 1000 to 10000.
Property	Playback Rate (milliseconds)	Playback Rate (msecs)	
Page	DNP Advanced Settings	Advanced	
Property	Time Synchronization Style	Time Sync Style	This property moved from "DNP Advanced Settings" to the Time Synchronization section of device "Communications".
Property	N/A	Checkbox: Use Delay Measure In Time Sync	This is a new property added to the Time Synchronization section of device "Communications". It is only available when Serial Time Sync Style is selected. When checked and a time sync is requested by the slave, the master will first send the function code 0x17. It will then wait for the response, calculate the propagation delay, and write the time to the slave. When unchecked, the master will write the time to the slave. **Note:** 4x never synced the time, using the delay measure function code.
Property	Default Operate Mode.	Operate Mode	
Property	Combo box – 'Display	Checkbox: Convert	This is used in the value of the tags with subtype

	DNP .TimeStamp as:' options: UTC, Local Time	UTC Timestamp to Local Time	.TimeStamp. When unchecked, UTC will be used.
Property	Automatically perform feedback poll after write	Enable Feedback Poll after write	
Property	Set bad tag quality when remote point is offline	N/A	The 5x driver determines the quality of the point by the flags returned with the data. The flags that cause bad quality are Restart, Lost, LocalForce, RemoteForce, Chatter, OverRange, and ReferenceCheck.

4. Comparison with Ethernet and Ethernet Encapsulation

Description	4x Ethernet	4x Ethernet Encapsulation	5x Ethernet	5x Ethernet Encapsulation
UDP binding to port	Binds to the Custom Channel Property Source Port.	Binds to the Serial Ethernet Encapsulation Channel Property Port (which is the same as the Destination Port).	Binds to the Custom Channel Property Source Port.	Binds to the Serial Ethernet Encapsulation Channel Property Port (which is the same as the Destination Port).
TCP binding to port	If the default adapter is not being used, this lets the OS assign port.	Always binds, and lets the OS assign port.	If the default adapter is not being used, this lets the OS assign port.	If the default adapter is not being used, this lets the OS assign port.

5. Addressing

Item	4x	5x	Notes
Object Group 10	Allowed the .Chatter subtype.	Does not allow .Chatter subtype	The flags for binary outputs are as follows: Online, Restart, Lost, RemoteForce, and LocalForce per DNP specifications.
Object Group 20	Allowed the .Chatter subtype.	Does not allow .Chatter subtype	The flags for counters are as follows: Online, Restart, Lost, RemoteForce, and LocalForce per DNP specifications.
Object Group 21	Allowed the .Chatter subtype.	Does not allow .Chatter subtype	The flags for frozen counters are as follows: Online, Restart, Lost, RemoteForce, and LocalForce per DNP specifications.
Object Group 30	Allowed the .Chatter subtype.	Does not allow .Chatter subtype	The flags for analog inputs are as follows: Online, Restart, Lost, RemoteForce, LocalForce, OverRange, and ReferenceCheck per DNP specifications.
Object Group 34	Allowed the .Timestamp, .Flags, .Chatter, .LocalForce, .Lost, .Online, .RemoteForce, .Restart subtypes.	Does not allow .Timestamp, .Flags, .Chatter, .LocalForce, .Lost, .Online, .RemoteForce, .Restart subtypes	No deadband variation returns timestamp or flags. There is no deadband event object group per DNP specifications.
Object Group 40	Allowed the .Chatter subtype.	Does not allow .Chatter subtype	The flags for analog inputs are as follows: Online, Restart, Lost, RemoteForce, LocalForce, OverRange, and ReferenceCheck per DNP specifications.

6. Error Descriptions

6.1   Address Validation Messages

4x Name	5x Name	Error Type	Possible Cause	Solution
Address '<address>' is not valid on device '<channel>' '<device>'	Address '<address>' is not valid on device '<channel>' '<device>'	Warning	A scan tag with an invalid address was sent to the driver for initialization.	Correct the address in the invalid tag.
Address '<address>' is out of range for the specified device or register	Address '<address>' is out of range for the specified device or register	Warning	A tag address that has been specified statically references a location that is beyond the range of supported locations for the device.	Verify that the address is correct; if it is not, re-enter the address in the client application.
Data type '<type>' is not valid for device address '<address>'	Data type '<type>' is not valid for device address '<address>'	Warning	A tag address that has been specified statically has been assigned an invalid data type.	Modify the requested data type in the client application.
Device address '<address>' contains a syntax error	Device address '<address>' contains a syntax error	Warning	A tag address that has been specified statically contains one or more invalid characters.	Re-enter the address in the client application.
Device address '<address>' is Read Only	Device address '<address>' is Read Only	Warning	A tag address that has been specified statically has a requested access mode that is not compatible with what the device supports for that address.	Change the access mode in the client application.
Device '<device name>' is not responding	Device '<device name>' is not responding	Serious	1. The serial connection between the device and the Host PC is broken.

2. The communications parameters for the serial connection are incorrect.

3. The named device may have been assigned an incorrect Network ID.

4. There is an improper timing setting or a nonresponsive device on the channel. | 1. Verify the cabling between the DNP master and the DNP slave device.

2. Verify that the specified communications parameters match those of the device.

3. Verify that the Network ID given to the named device matches that of the actual device. |
| Unable to write to '<address>' on device '<device>' | Unable to write to '<address>' on device '<device>' | Serious | 1. The network connection between the device and the Host PC is broken.

2. The communications parameters configured for the device and driver do not match. | 1. Verify the cabling between the PC and the PLC device.

2. Verify that the specified communications parameters match those of the device. |
| DNP3 Channel '<channel>' initialization failed | N/A | | | |
| DNP3 Session '<device>' initialization failed | N/A | | | |

6.2   DNP Specific Error Messages - Unable to write to '<address>' on device '<device>'

4x Error Name	5x Error Name	Error Type	Possible Cause	Solution
N/A	~ Internal Error occurred	Fatal	An internal error occurred within the driver.	The driver may recover on its own. If the problem persists, restart the master.
N/A	~ Failed to initialize communication stack	Fatal	The driver was unable to initialize the communication stack.	Reinitialize the driver by right-clicking on the Administration menu and selecting **Reinitialize**. If the problem persists, restart the master.
N/A	~ Session shutting down or duplicate request	Warning	The client disconnected because a transaction is in progress.	Confirm that the connection between the master and the slave is okay.
'<address>': Unsupported Operation Type: '<number>'	~ Unsupported Operation Type	Warning	An invalid DNP operation code was specified when writing to the .Operate.OpType tag.	Correct the .Operate.OpType tag's value.
'<address>': Unsupported Trip-Close Code: ' <number>'	~ Unsupported Trip-Close Code	Warning	An invalid DNP Trip-Close code was specified when writing to the .Operate.TripCloseCode tag.	Correct the Operate.TripCloseCode tag's value.
N/A	~ Unrecognized Object returned in Response	Warning	1. The slave does not support the value being written to the object group. 2. The slave does not support the Read request.	1. Change the value to one supported by the slave. 2. Change the request to one supported by the slave.
N/A	~ Select Operate response invalid	Warning	The device did not return an acceptable response to a Select then Operate request.	Verify that the slave is configured to operate on the point.
N/A	~ Write value specified is invalid	Warning	An invalid value was written to Operate.Set, Operate, object group 60, Warmrestart, or Coldrestart tag.	Correct the value written to the Operate. Operate, object group 60, Warmrestart, or Coldrestart tag.
Write to address '<address>' failed with status code '<code number>'.	~ Control-Related Status Code '<status code>'	Warning	The value written to the .Operate sub-type was not understood by the DNP slave.	Consult the DNP slave documentation for the meaning of the code number.
N/A	~ Device reports that some output points are in local mode (IIN1.5)	Warning	The device reports that some output points are in local mode.	Correct the mode in the slave's configuration.
N/A	~ An abnormal condition exists in the device (IIN1.6)	Warning	An abnormal condition has occurred that is specific to the device.	Resolve any hardware issues found in the slave.
N/A	~ Device does not support the function code (IIN2.0)	Warning	The device does not support the function code.	None.
N/A	~ Device does not support requested operation for objects in the request (IIN2.1)	Warning	The device does not support requested operation for objects in the request.	Verify that the slave does support the requested operation.
N/A	~ Device does	Warning	1. The device does not support a	Change the tag address to one

	not support a point in the range or other parameter error (IIN2.2)		point in the specified range. 2. The device does not understand the parameters sent in the request.	supported by the slave.
N/A	~ Device reports that the operation is already executing (IIN2.4)	Warning	The specified address is being acted upon by another client.	1. Stop the other client from acting upon the address. 2. Delay the operation of the address.
N/A	~ Device detected corrupt configuration (IIN2.5)	Warning	The device has detected that its configuration is corrupt.	Reconfigure the slave.

6.3 DNP Specific Error Messages - Unable to read point(s) '<OBJ.VAR.IDX>' on device '<device>'.

4x Error Name	5x Error Name	Error Type	Possible Cause	Solution
N/A	~ Internal Error occurred	Fatal	An internal error occurred within the driver.	The driver may recover on its own. If the problem persists, restart the master.
N/A	~ Failed to initialize communication stack	Fatal	The driver was unable to initialize the communication stack.	Reinitialize the driver by right-clicking on the Administration menu and selecting **Reinitialize**. If the problem persists, restart the master.
N/A	~ Session shutting down or duplicate request	Warning	The client disconnected because a transaction is in progress.	Confirm that the connection between the master and the slave is okay.
N/A	~ Unrecognized Object returned in Response	Warning	1. The slave does not support the value being written to the object group. 2. The slave does not support the Read request.	1. Change the value to one supported by the slave. 2. Change the request to one supported by the slave.
N/A	~ Device reports that some output points are in local mode (IIN1.5)	Warning	The device reports that some output points are in local mode.	Correct the mode in the slave's configuration.
N/A	~ An abnormal condition exists in the device (IIN1.6)	Warning	An abnormal condition has occurred that is specific to the device.	Resolve any hardware issues found in the slave.
N/A	~ Device does not support the function code (IIN2.0)	Warning	The device does not support the function code.	None.
N/A	~ Device does not support requested operation for objects in the request (IIN2.1)	Warning	The device does not support requested operation for objects in the request.	Verify that the slave supports the requested operation.
N/A	~ Device does not support a point in the range or other parameter error (IIN2.2)	Warning	1. The device does not support a point in the specified range. 2. The device does not understand the parameters sent in the request.	Change the point(s) to one supported by the slave.
N/A	~ Device reports that the operation is already executing (IIN2.4)	Warning	The specified point is being acted upon by another client.	1. Stop the other client from acting upon the points. 2. Delay the operation of the points.
N/A	~ Device detected corrupt configuration (IIN2.5)	Warning	The device has detected that its configuration is corrupt.	Reconfigure the slave.

6.4   DNP Specific Error Messages - Unable to read point(s) '<OBJ.VAR.IDX> - <OBJ.VAR.IDX>' on device '<device>'

4x Error Name	5x Error Name	Error Type	Possible Cause	Solution
N/A	~ Internal Error occurred	Fatal	An internal error occurred within the driver.	The driver may recover on its own. If the problem persists, restart the master.
N/A	~ Failed to initialize communication stack	Fatal	The driver was unable to initialize the communication stack.	Reinitialize the driver by right-clicking on the Administration menu and selecting **Reinitialize**. If the problem persists, restart the master.
N/A	~ Session shutting down or duplicate request	Warning	The client disconnected because a transaction is in progress.	Confirm that the connection between the master and the slave is okay.
N/A	~ Unrecognized Object returned in Response	Warning	1. The slave does not support the value being written to the object group. 2. The slave does not support the Read request.	1. Change the value to one supported by the slave. 2. Change the request to one supported by the slave.
N/A	~ Device reports that some output points are in local mode (IIN1.5)	Warning	The device reports that some output points are in local mode.	Correct the mode in the slave's configuration.
N/A	~ An abnormal condition exists in the device (IIN1.6)	Warning	An abnormal condition has occurred that is specific to the device.	Resolve any hardware issues found in the slave.
N/A	~ Device does not support the function code (IIN2.0)	Warning	The device does not support the function code.	None.
N/A	~ Device does not support requested operation for objects in the request (IIN2.1)	Warning	The device does not support requested operation for objects in the request.	Verify that the slave does support the requested operation.
N/A	~ Device does not support a point in the range or other parameter error (IIN2.2)	Warning	1. The device does not support a point in the specified range. 2. The device does not understand the parameters sent in the request.	Change the points to ones supported by the slave.
N/A	~ Device reports that the operation is already executing (IIN2.4)	Warning	The specified point is being acted upon by another client.	1. Stop the other client from acting upon the points. 2. Delay the operation of the points.
N/A	~ Device detected corrupt configuration (IIN2.5)	Warning	The device has detected that its configuration is corrupt.	Reconfigure the slave.

6.5   DNP Specific Error Messages - Unable to read tag '<address>' on device '<device>'

4x Error Name	5x Error Name	Error Type	Possible Cause	Solution
N/A	~ Response missing data	Warning	Although the response from the slave indicated success, data for one or more points in the requested range was not included in the response.	Confirm that the points are enabled in the slave.

6.6   DNP Specific Error Messages - Dialog Box Pop Ups

4x Error Name	5x Error Name	Error Type	Possible Cause	Solution
N/A	Master Address '<16-bit address>' and Slave Address '<16-bit address>' combination already in use on Device '<device>'!	Warning	Each master and slave device on a single communication channel must utilize a DNP address in the range 0 through 65519 that is unique from all other devices on the channel.	Verify the master and slave addresses configured at the slave. Change the duplicate address.
N/A	Destination '<IP Address>:<Port Number>' already in use on Channel '<channel>'!	Warning	The Destination IP and Port are already in use. Each communication channel must utilize a unique Destination IP and Port.	Verify that no other channel is configured with the same Destination IP and Port. If so, change the duplicate.

6.7   DNP Specific Error Messages - Informational

4x Error Name	5x Error Name	Error Type	Possible Cause	Solution
N/A	Device '<device>' Restarting	Information	The client wrote a "1" to a Warmrestart or Coldrestart tag. The device is restarting.	N/A.
N/A	Device '<device>' does not support the LAN Time Sync Style Record Current Time Function Code 24	Warning	The device does not support LAN (function code 24) which is the specified time synchronization method.	Verify that the device supports function code 24. If not, locate the **Communications** tab in **Device Properties**, and then change the time synchronization setting to **Serial**.