# DNP3 Router

## Logix RTU Outstation

Technical Application Note

### A-DNP3R

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# 1. PREFACE

## 1.1. PURPOSE OF THIS DOCUMENT

This document will assist the user to setup a Logix Controller as a DNP3 Outstation RTU using Aparian's DNP3 Router.

## 1.2. ADDITIONAL INFORMATION

The following resources contain additional information that can assist the user with the module installation and operation.

| Resource | Link |
|---|---|
| Slate Installation | http://www.aparian.com/software/slate |
| DNP3 Router User Manual<br>DNP3 Router Datasheet<br>Example Code & UDTs | http://www.aparian.com/products/dnp3router |
| Ethernet wiring standard | www.cisco.com/c/en/us/td/docs/video/cds/cde/cde205_220_420/installation/guide/cde205_220_420_hig/Connectors.html |
| CIP Routing | The CIP Networks Library, Volume 1, Appendix C:Data Management |
| DNP3 | http://www.dnp.org |
| Slate Installation | http://www.aparian.com/software/slate |

## 1.3. SUPPORT

Technical support will be provided via the Web (in the form of user manuals, FAQ, datasheets etc.) to assist with installation, operation, and diagnostics.

For additional support the user can use either of the following:

| | |
|---|---|
| Contact Us web link | www.aparian.com/contact-us |
| Support email | support@aparian.com |

# 2. APPLICATION DESCRIPTION

The Aparian DNP3 Router can be used with a Logix Controller (ControlLogix or CompactLogix) to operate as a DNP3 Outstation RTU. The below diagram is an example of a typical network setup.

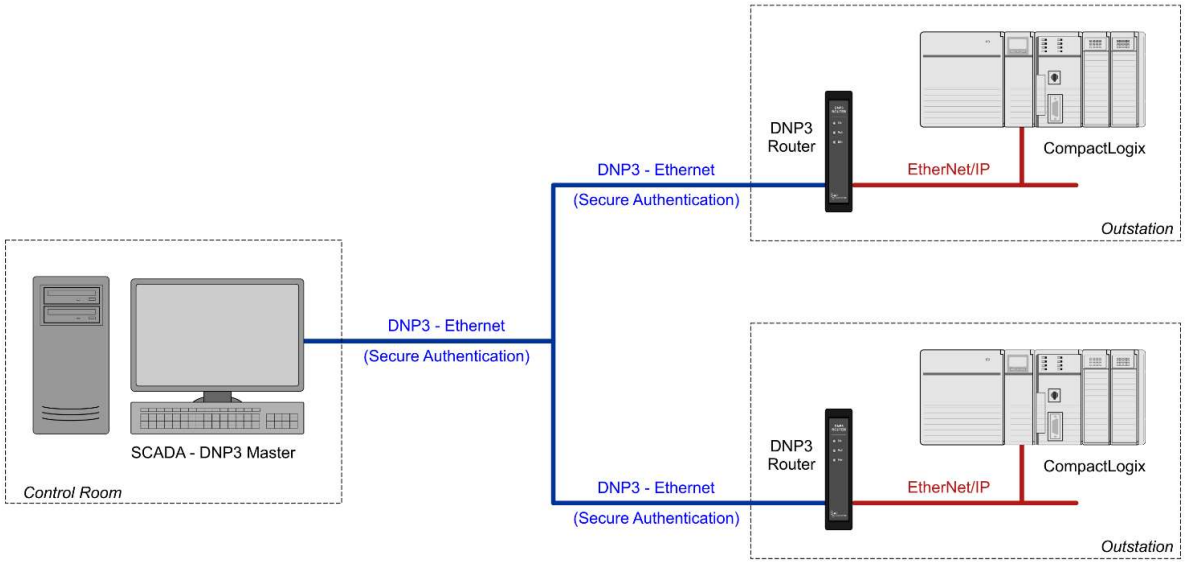



FIGURE 2.1 - EXAMPLE OF A TYPICAL NETWORK SETUP

When setup correctly the DNP3 Master will communicate with the Logix Controller (via the DNP3 Router) in a similar manner as a normal DNP3 RTU (supporting DNP3 device attributes, DNP3 events, and DNP3 commands).

# 3. SETUP

The following sections describe the configuration required for a Logix controller to operate as a DNP3 Outstation RTU.

## 3.1. DNP3 DEVICE ATTRIBUTES

The DNP3 Router will respond to Device Attribute requests from the DNP3 Master which will provide the DNP3 Master with various identity and capability information. Certain attributes can be configured via Aparian's Slate application to provide a custom identity for a specific Logix Controller. Below is an example of how the DNP3 Device Attributes can be configured for a CompactLogix controller.

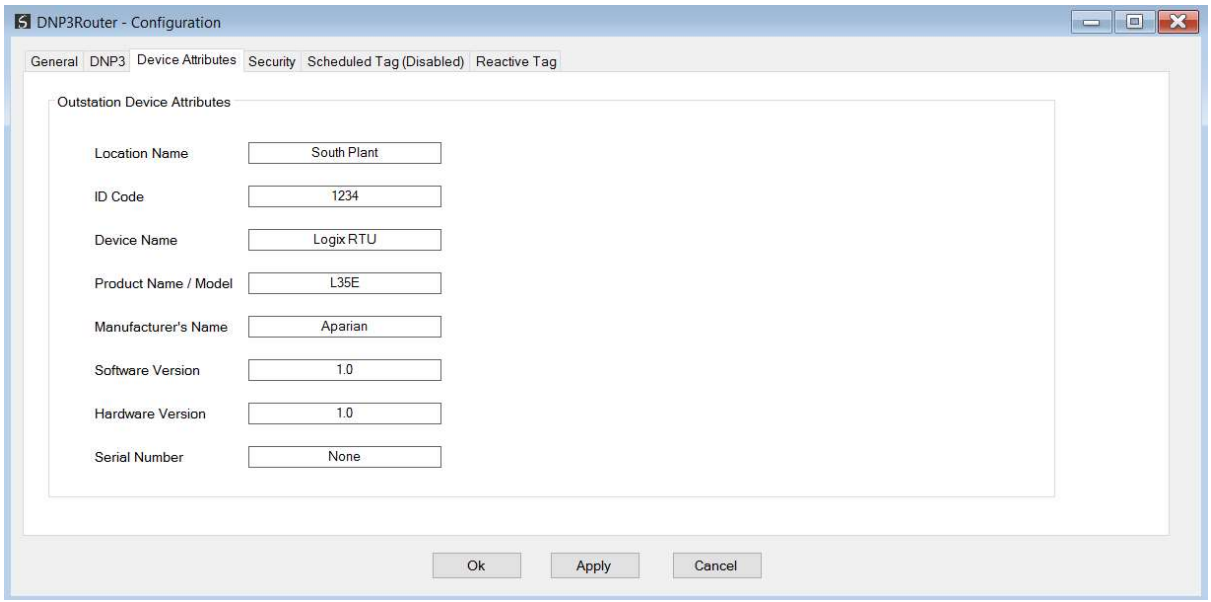



FIGURE 3.1 – DEVICE ATTRIBUTES

## 3.2. DNP3 GROUPS AND VARIATIONS

The DNP3 Router provides an interface for various DNP3 Groups and Variations (which is included in DNP3 Conformance Level 3). For a Logix Controller to seamlessly integrate with the DNP3 Router the provided UDTs must be used for each specific DNP3 Group/Variation combination (see the *Notes* section for all supported groups and variations with their required Logix UDT).

The reason for using specific UDTs (provided in the DNP3 Example Code) is due to the DNP3 data formats not being 32-bit aligned. The supported DNP3 Groups and their equivalent Logix UDTs are described below.

### 3.2.1. Group 1 – Binary Inputs

Binary Inputs have two variations as shown in the table below:

| Group | Group Description | Var. Code | Variation Description | Recommended Data Type |
|---|---|---|---|---|
| 1 | Binary Inputs | 1 | Packed Format | SINT |
| | | 2 | With Flags | AparianDNP3BinaryInputWithFlag |

Table 3.1 - DNP3 Binary Input Group Variations

Below is the UDT for variation 2. The status for the Binary Input is provided in the first 6 bits with the actual Binary Input value found in the last bit (*State*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *State* bit to change the binary value.

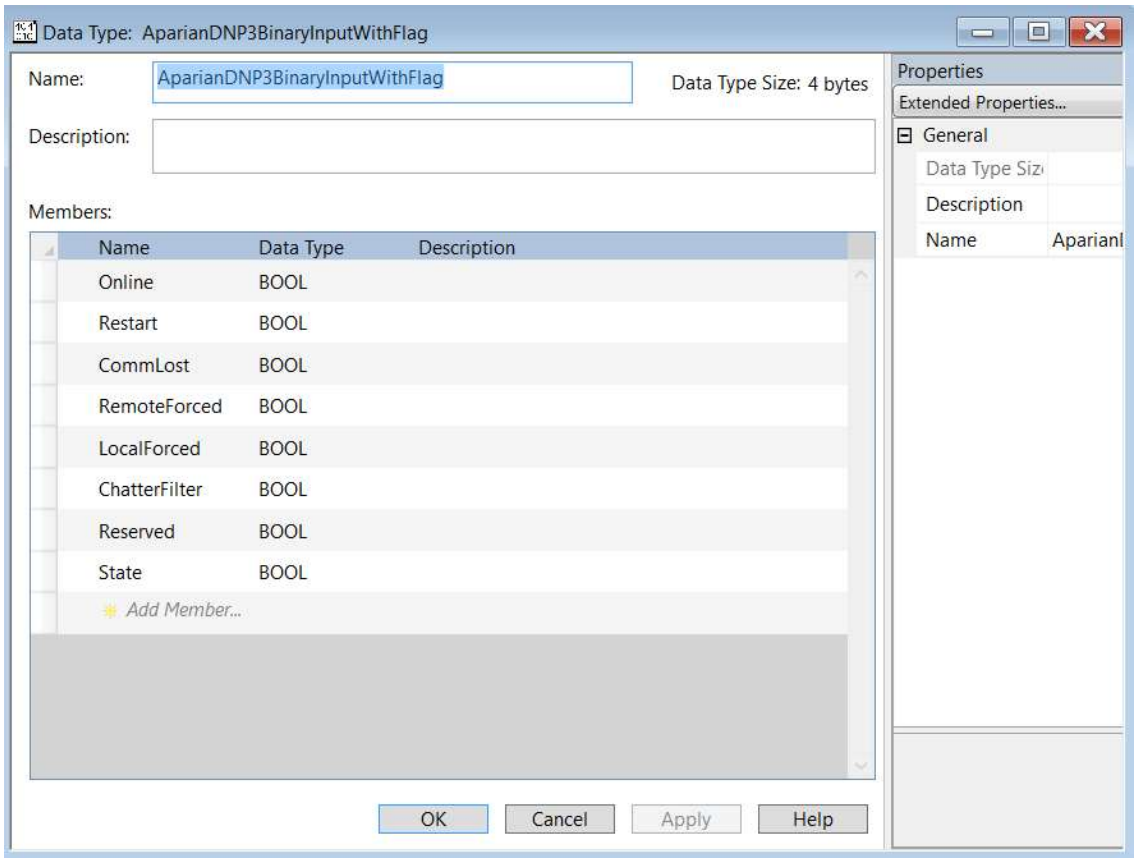



Figure 3.2 - DNP3 Binary Input Group Variation 2

### 3.2.2. GROUP 3 – DOUBLE BIT BINARY INPUTS

Double Binary Inputs has two variations as shown in the table below:

| Group | Group Description | Var. Code | Variation Description | Recommended Data Type |
|---|---|---|---|---|
| 3 | Double Bit Binary Inputs | 1 | Packed Format | SINT |
| | | 2 | With Flags | AparianDNP3DoubleBinaryInputWithFlag |

TABLE 3.2 - DNP3 DOUBLE BINARY INPUT GROUP VARIATIONS

Below is the UDT for variation 2. The status for the Binary Input is provided in the first 6 bits with the actual Double Binary Input values found in the last two bits (*State0* and *State1*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *State0* and *State1* bits to change the double binary value.

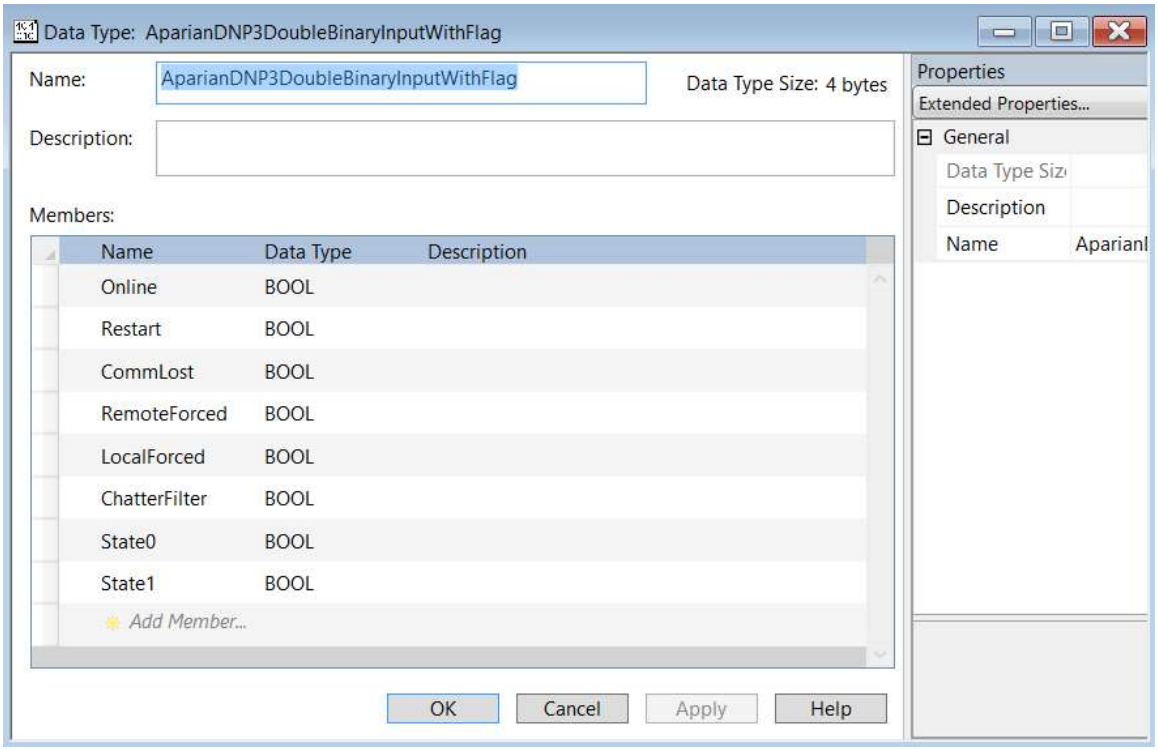



FIGURE 3.3 - DNP3 DOUBLE BINARY INPUT GROUP VARIATION 2

### 3.2.3. GROUP 10 – BINARY OUTPUTS

Binary Outputs has two variations as shown in the table below:

| Group | Group Description | Var. Code | Variation Description | Recommended Data Type |
|---|---|---|---|---|
| 10 | Binary Outputs | 1 | Packed Format | SINT |
| | | 2 | Output Status With Flags | AparianDNP3BinaryOutputWithFlag |

TABLE 3.3 - DNP3 BINARY INPUT GROUP VARIATIONS

Below is the UDT for variation 2. The status for the Binary Output is provided in the first 6 bits with the actual Binary Input value found in the last bit (*State*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *State* bit to change the binary value.

NOTE: The updating of these values will be discussed in the DNP3 Commands section.

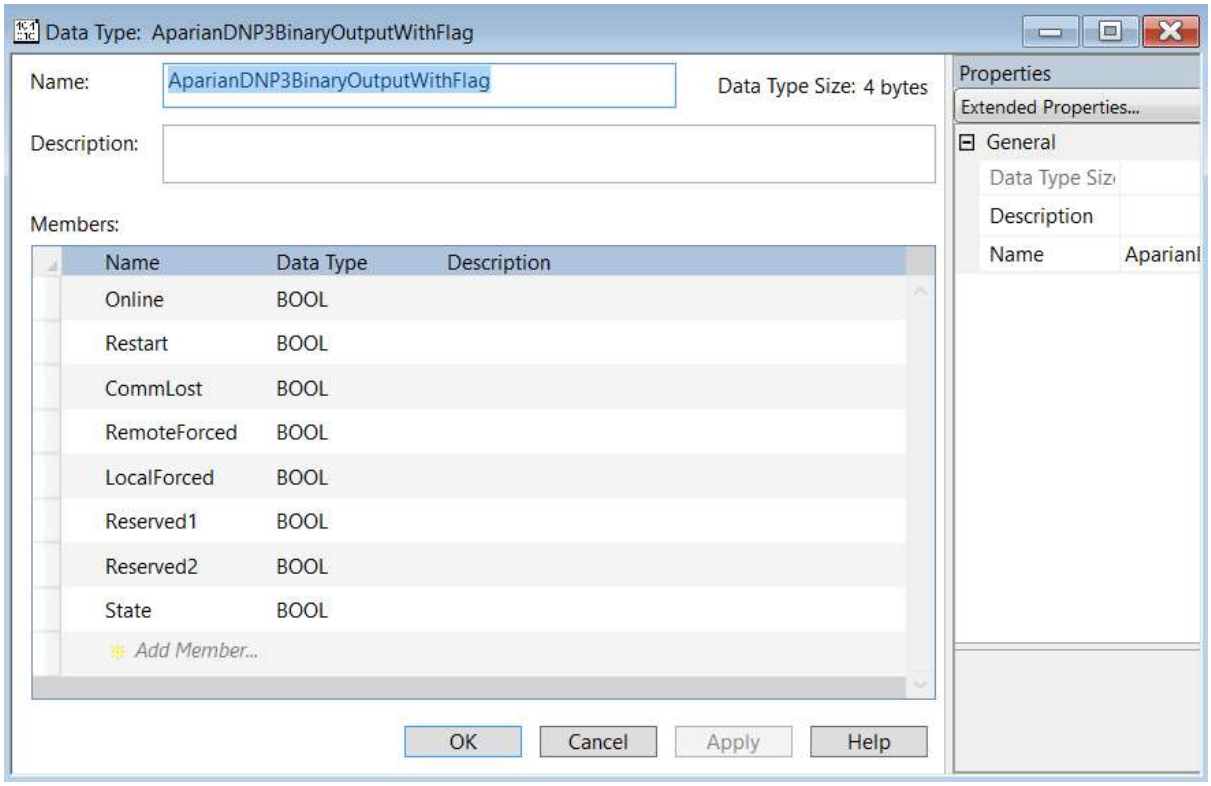



FIGURE 3.4 - DNP3 BINARY INPUT GROUP VARIATION 2

### 3.2.4. GROUP 20 – COUNTERS

Counters has four variations as shown in the table below:

| Group | Group Description | Var. Code | Variation Description | Recommended Data Type |
|---|---|---|---|---|
| 20 | Counters | 1 | 32-bit With Flag | AparianDNP3Counter32WithFlag |
| | | 2 | 16-bit With Flag | AparianDNP3Counter16WithFlag |
| | | 5 | 32-bit Without Flag | DINT |
| | | 6 | 16-bit Without Flag | INT |

TABLE 3.4 - DNP3 COUNTER GROUP VARIATIONS

Below is the UDT for variation 1. The status for the Counter is provided in the first 7 bits with the actual Counter value found in the DINT (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* DINT to change the counter value.

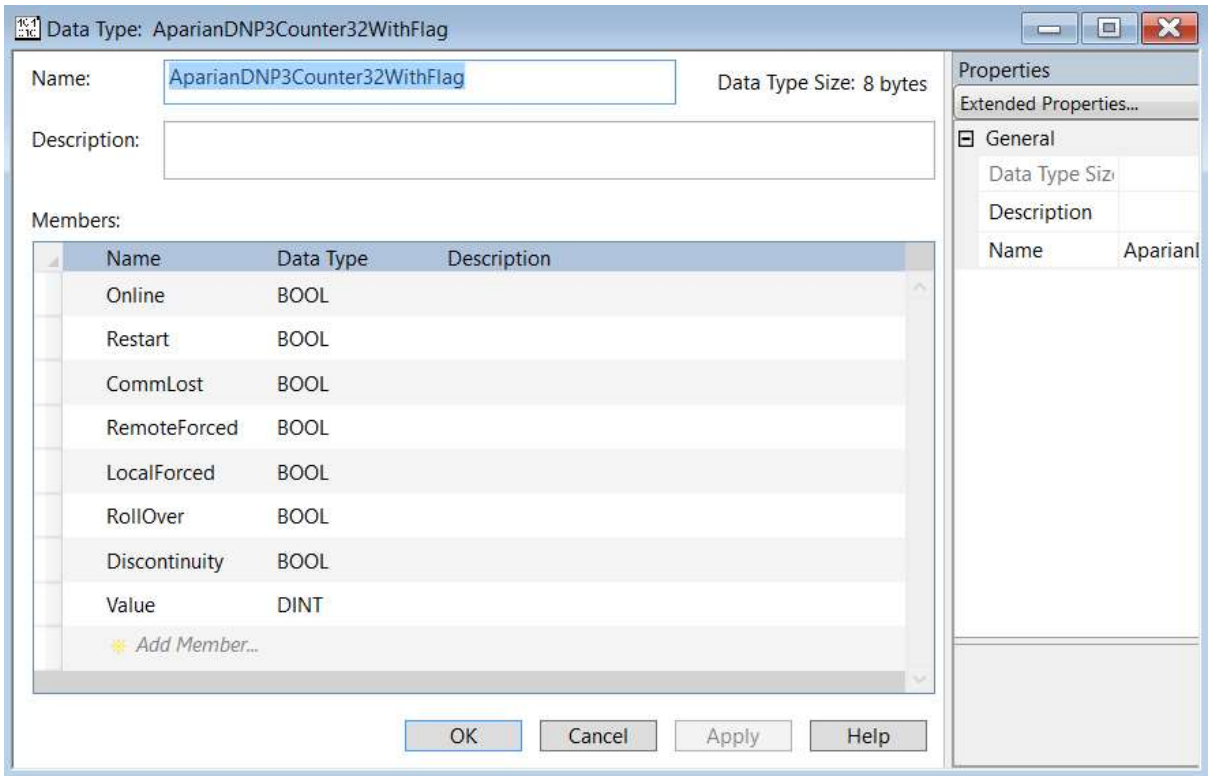



FIGURE 3.5 - DNP3 COUNTER GROUP VARIATION 1

Below is the UDT for variation 2. The status for the Counter is provided in the first 7 bits with the actual Counter value found in the INT (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* INT to change the counter value.

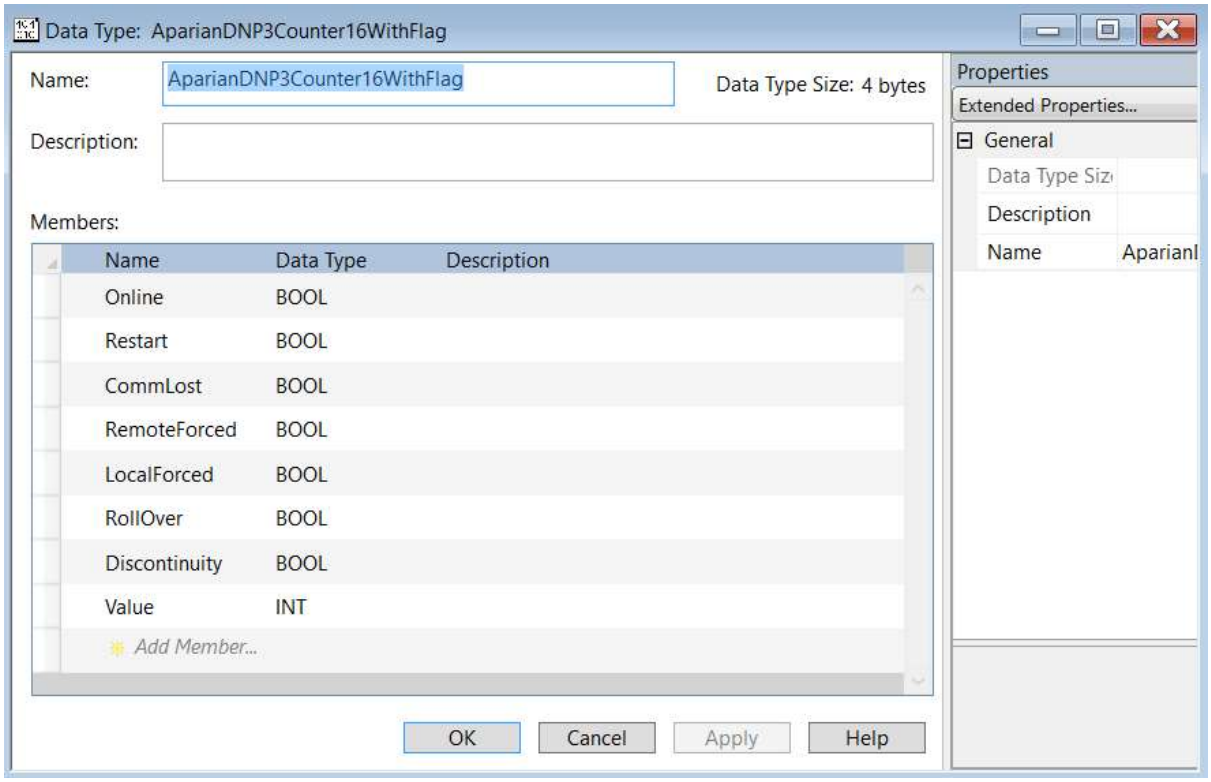



FIGURE 3.6 - DNP3 COUNTER GROUP VARIATION 2

### 3.2.5. GROUP 21 – FROZEN COUNTERS

Frozen Counters has six variations as shown in the table below:

| Group | Group Description | Var. Code | Variation Description | Recommended Data Type |
|---|---|---|---|---|
| 21 | Frozen Counters | 1 | 32-bit With Flag | AparianDNP3Counter32WithFlag |
| | | 2 | 16-bit With Flag | AparianDNP3Counter16WithFlag |
| | | 5 | 32-bit With Flag And Time | AparianDNP3Counter32WithFlagTime |
| | | 6 | 16-bit With Flag And Time | AparianDNP3Counter16WithFlagTime |
| | | 9 | 32-bit Without Flag | DINT |
| | | 10 | 16-bit Without Flag | INT |

TABLE 3.5 - DNP3 FROZEN COUNTER GROUP VARIATIONS

Below is the UDT for variation 1. The status for the Frozen Counter is provided in the first 7 bits with the actual Frozen Counter value found in the DINT (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* DINT to change the frozen counter value.

NOTE: The updating of these values will be discussed in the DNP3 Commands section.

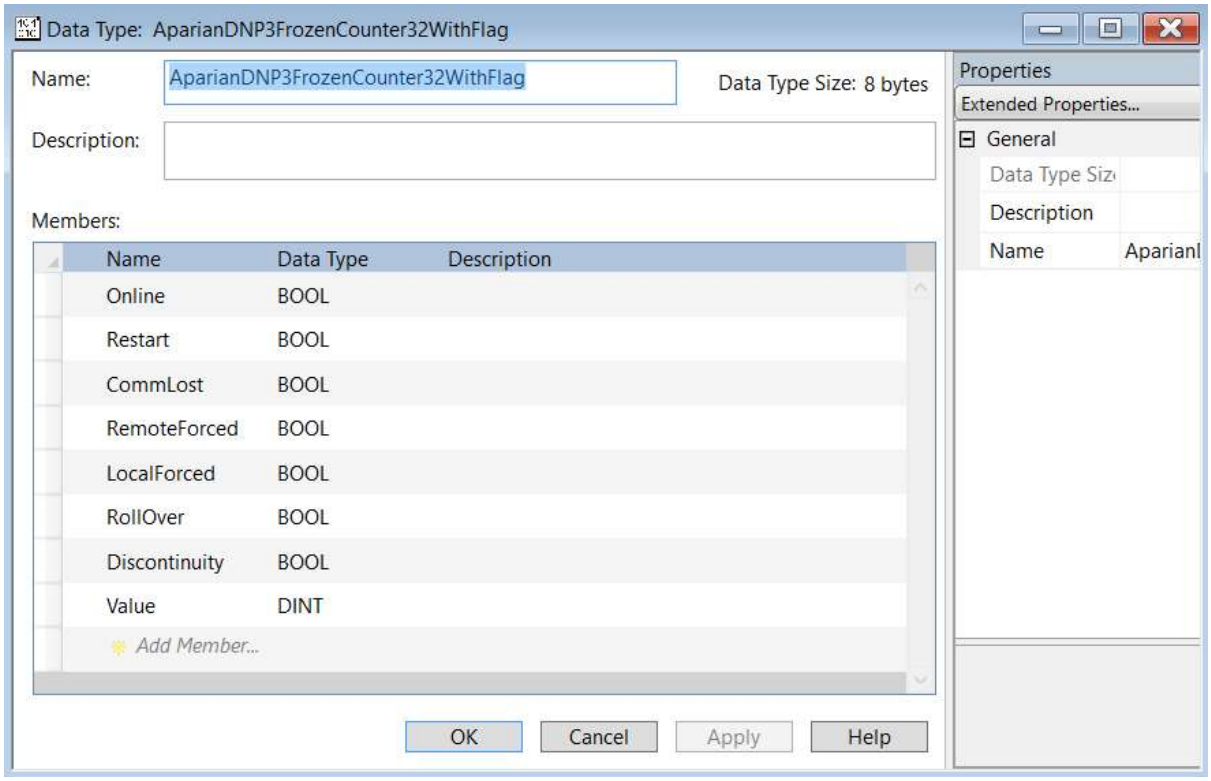



FIGURE 3.7 - DNP3 FROZEN COUNTER GROUP VARIATION 1

Below is the UDT for variation 2. The status for the Frozen Counter is provided in the first 7 bits with the actual Frozen Counter value found in the INT (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* INT to change the frozen counter value.

NOTE: The updating of these values will be discussed in the DNP3 Commands section.

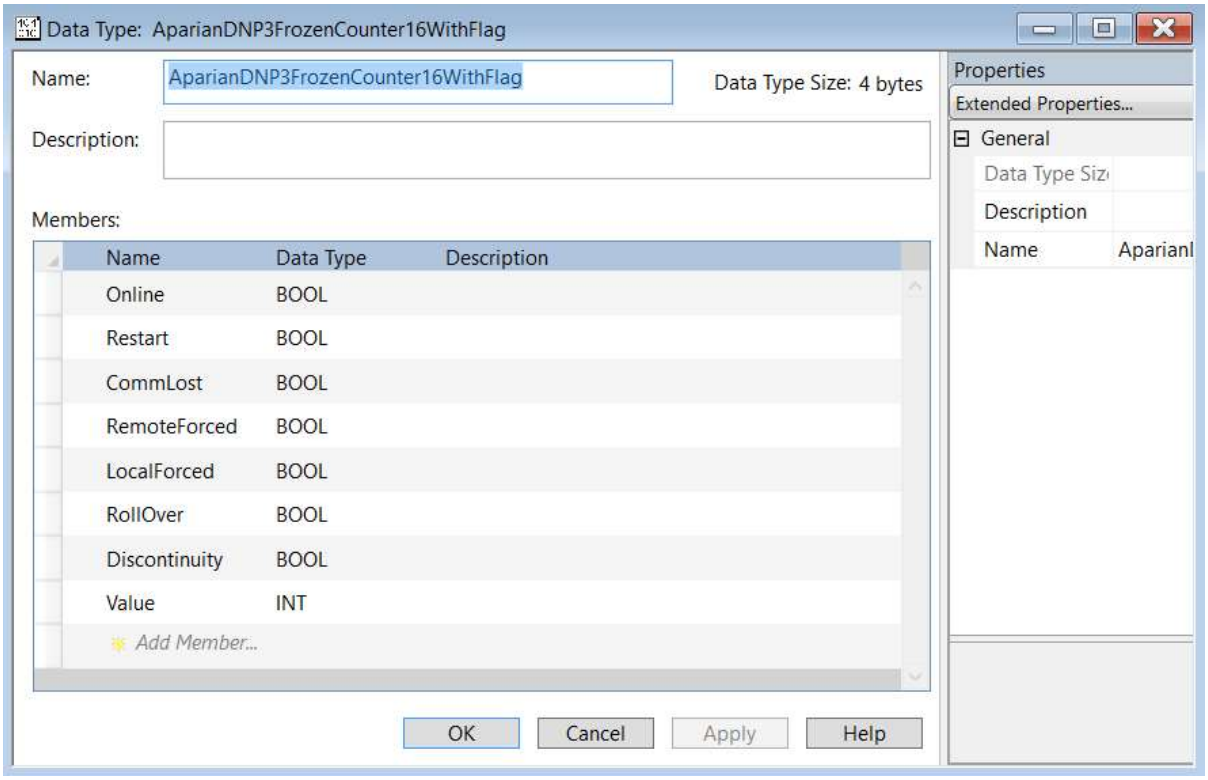



FIGURE 3.8 - DNP3 FROZEN COUNTER GROUP VARIATION 2

Below is the UDT for variation 3. The status for the Frozen Counter is provided in the first 7 bits with the actual Frozen Counter value found in the DINT (*Value*). The UDT also provides a time of occurrence (TOC) which is when a Freeze Command was received for the specific Counter. The TOC is Unix Time in milliseconds (milliseconds since the 1 Jan 1970).

For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* DINT to change the frozen counter value.

NOTE: The updating of these values will be discussed in the DNP3 Commands section.

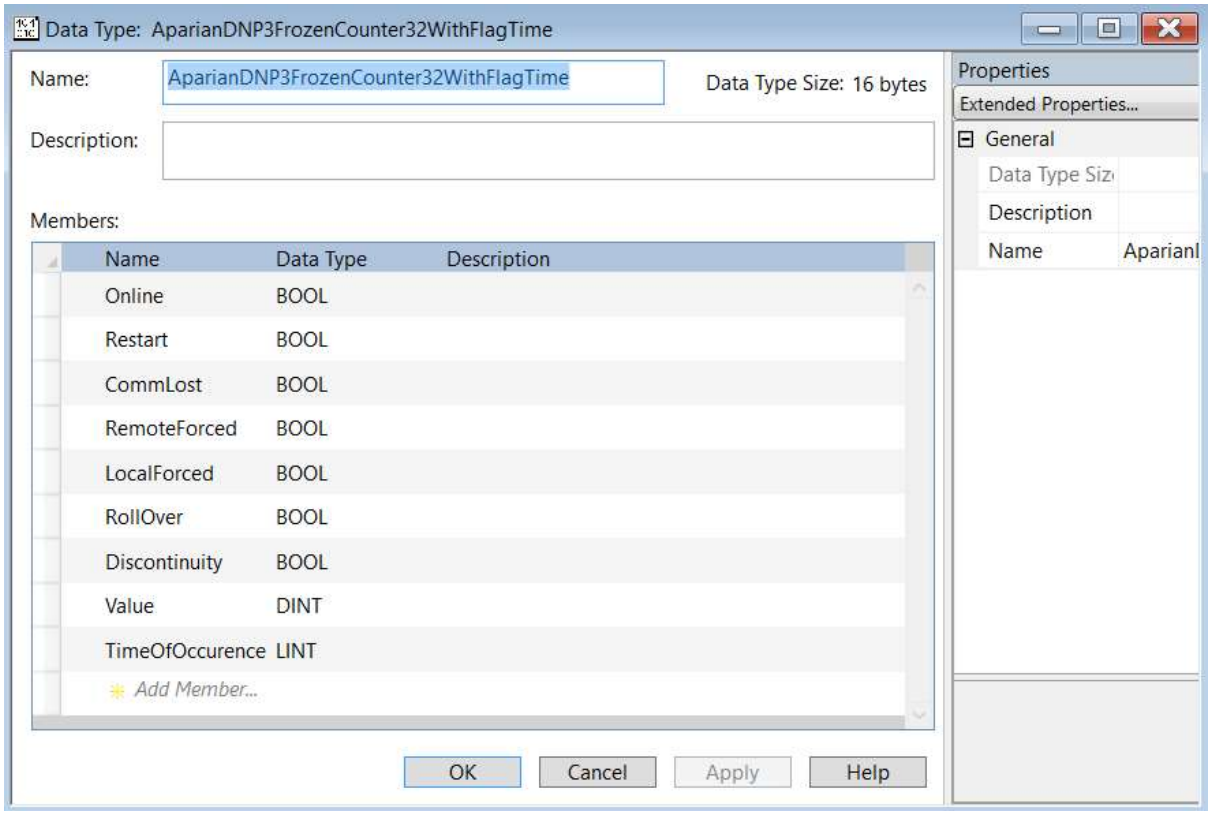



FIGURE 3.9 - DNP3 FROZEN COUNTER GROUP VARIATION 3

Below is the UDT for variation 4. The status for the Frozen Counter is provided in the first 7 bits with the actual Frozen Counter value found in the INT (*Value*). The UDT also provides a time of occurrence (TOC) which is when a Freeze Command was received for the specific Counter. The TOC is Unix Time in milliseconds (milliseconds since the 1 Jan 1970).

For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* INT to change the frozen counter value.

NOTE: The updating of these values will be discussed in the DNP3 Commands section.

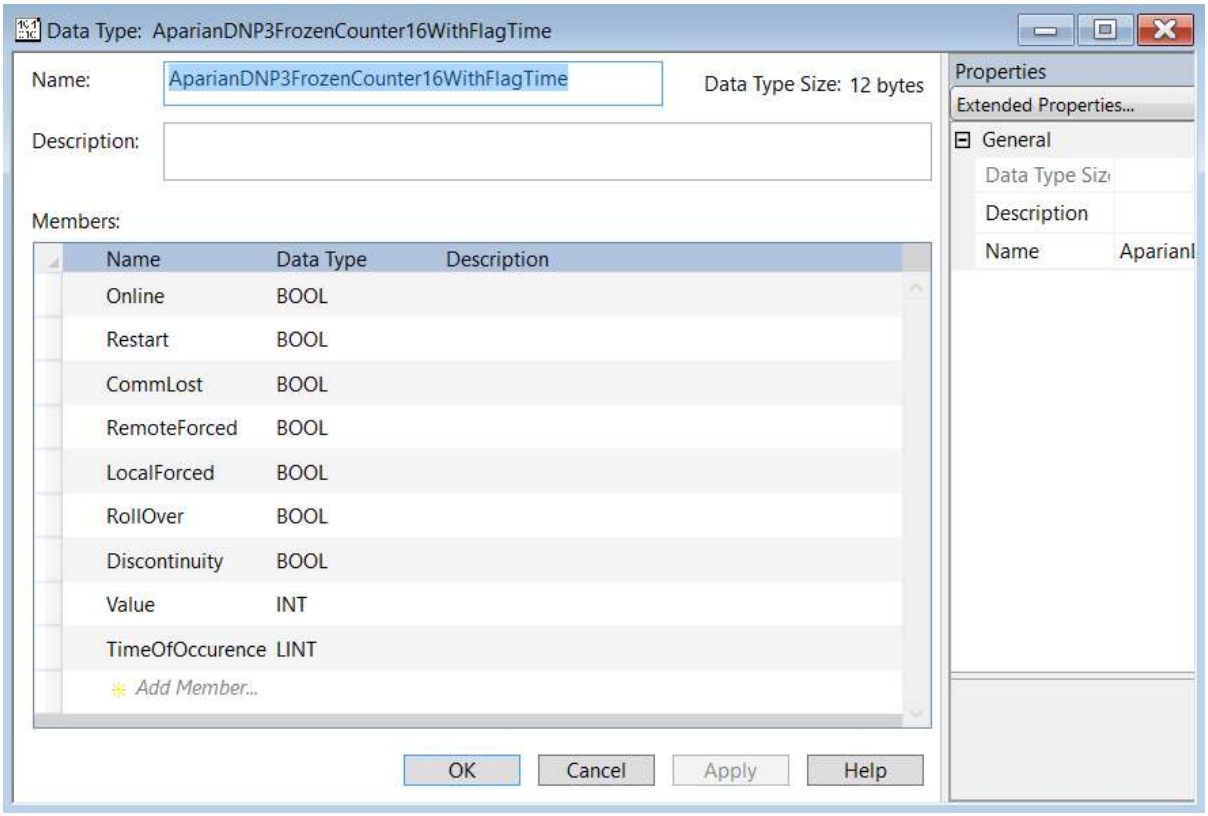



FIGURE 3.10 - DNP3 FROZEN COUNTER GROUP VARIATION 4

### 3.2.6. GROUP 30 – ANALOG INPUTS

Analog Inputs has five variations as shown in the table below:

| Group | Group Description | Var. Code | Variation Description | Recommended Data Type |
|---|---|---|---|---|
| 30 | Analog Inputs | 1 | 32-bit With Flag | AparianDNP3AnalogInput32Flag |
| | | 2 | 16-bit With Flag | AparianDNP3AnalogInput16Flag |
| | | 3 | 32-bit Without Flag | DINT |
| | | 4 | 16-bit Without Flag | INT |
| | | 5 | Single Floating Point With Flag | AparianDNP3AnalogInputRealFlag |

TABLE 3.6 - DNP3 ANALOG INPUTS GROUP VARIATIONS

Below is the UDT for variation 1. The status for the Analog Input is provided in the first 7 bits with the actual Analog Input value found in the DINT (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* DINT to change the Analog Input value.

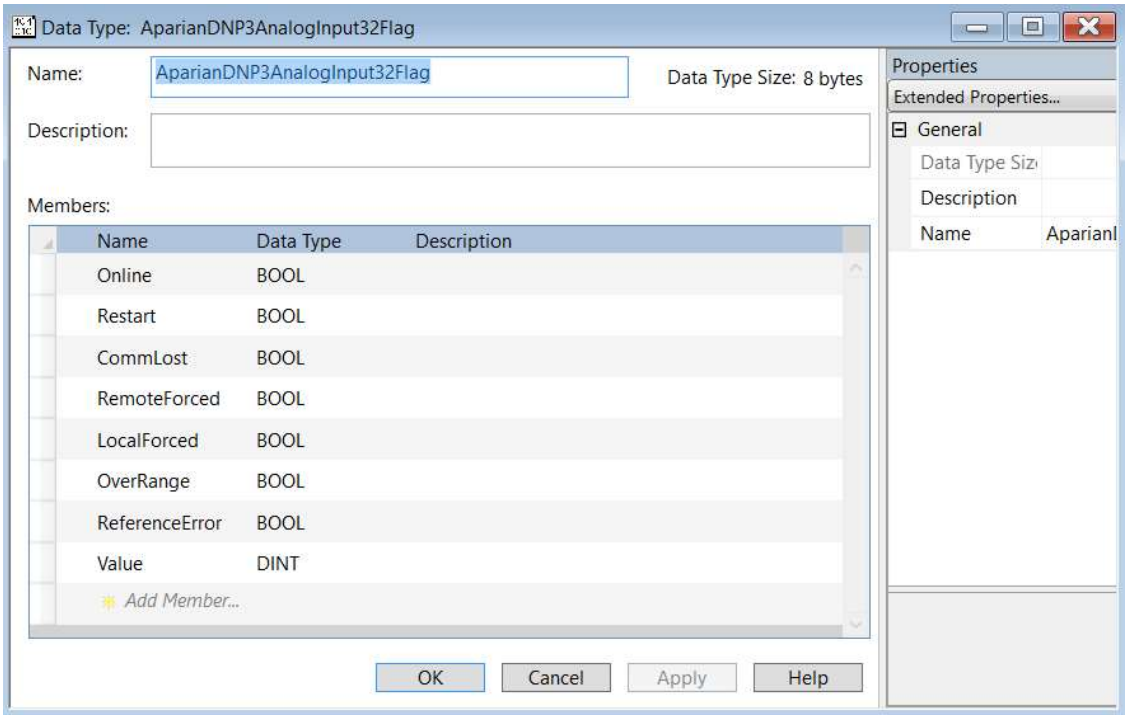



FIGURE 3.11 - DNP3 ANALOG INPUT GROUP VARIATION 1

Below is the UDT for variation 2. The status for the Analog Input is provided in the first 7 bits with the actual Analog Input value found in the INT (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* INT to change the Analog Input value.

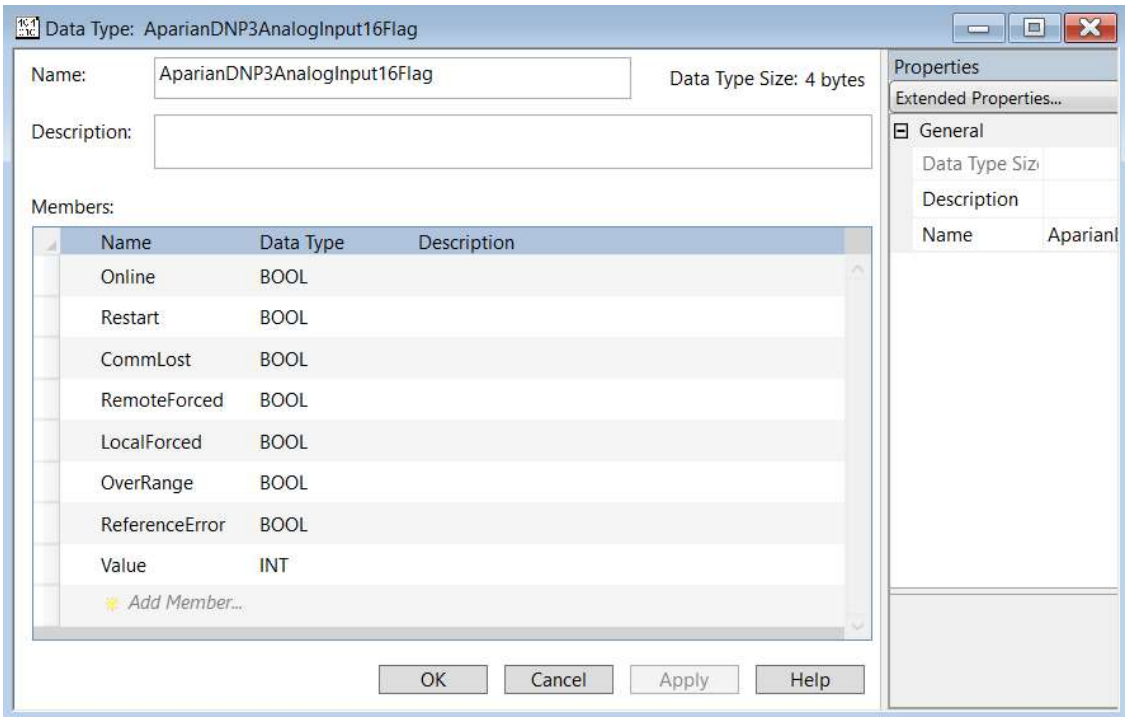



FIGURE 3.12 - DNP3 ANALOG INPUT GROUP VARIATION 2

Below is the UDT for variation 5. The status for the Analog Input is provided in the first 7 bits with the actual Analog Input value found in the REAL (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* REAL to change the Analog Input value.

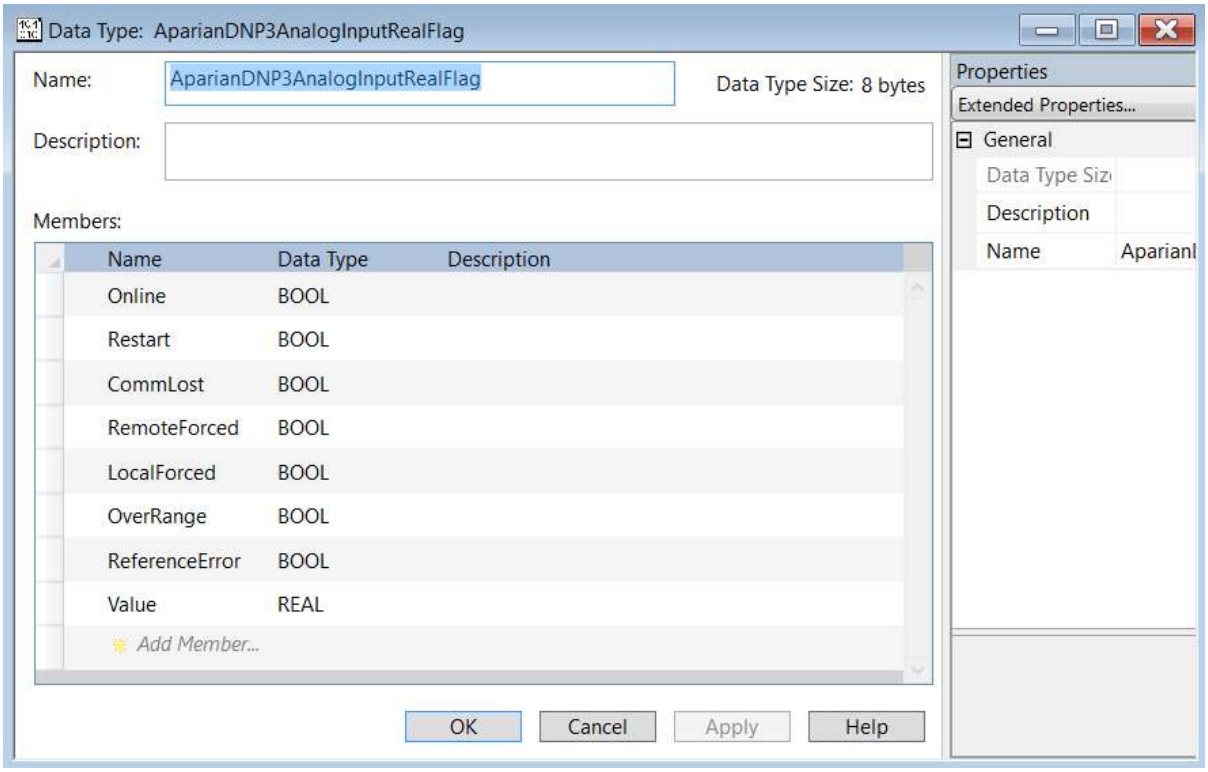



FIGURE 3.13 - DNP3 ANALOG INPUT GROUP VARIATION 5

### 3.2.7. GROUP 40 – ANALOG OUTPUT STATUS

Analog Output Status has three variations as shown in the table below:

| Group | Group Description | Var. Code | Variation Description | Recommended Data Type |
|---|---|---|---|---|
| 40 | Analog Output Status | 1 | 32-bit With Flag | AparianDNP3AnalogOutput32Flag |
| | | 2 | 16-bit With Flag | AparianDNP3AnalogOutput16Flag |
| | | 3 | Single Floating Point With Flag | AparianDNP3AnalogOutputRealFlag |

TABLE 3.7 - DNP3 ANALOG OUTPUT STATUS GROUP VARIATIONS

Below is the UDT for variation 1. The status for the Analog Output Status is provided in the first 7 bits with the actual Analog Output value found in the DINT (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3

Master that the element is active and the update the *Value* DINT to change the Analog Output value.

NOTE: The updating of these values will be discussed in the DNP3 Commands section.

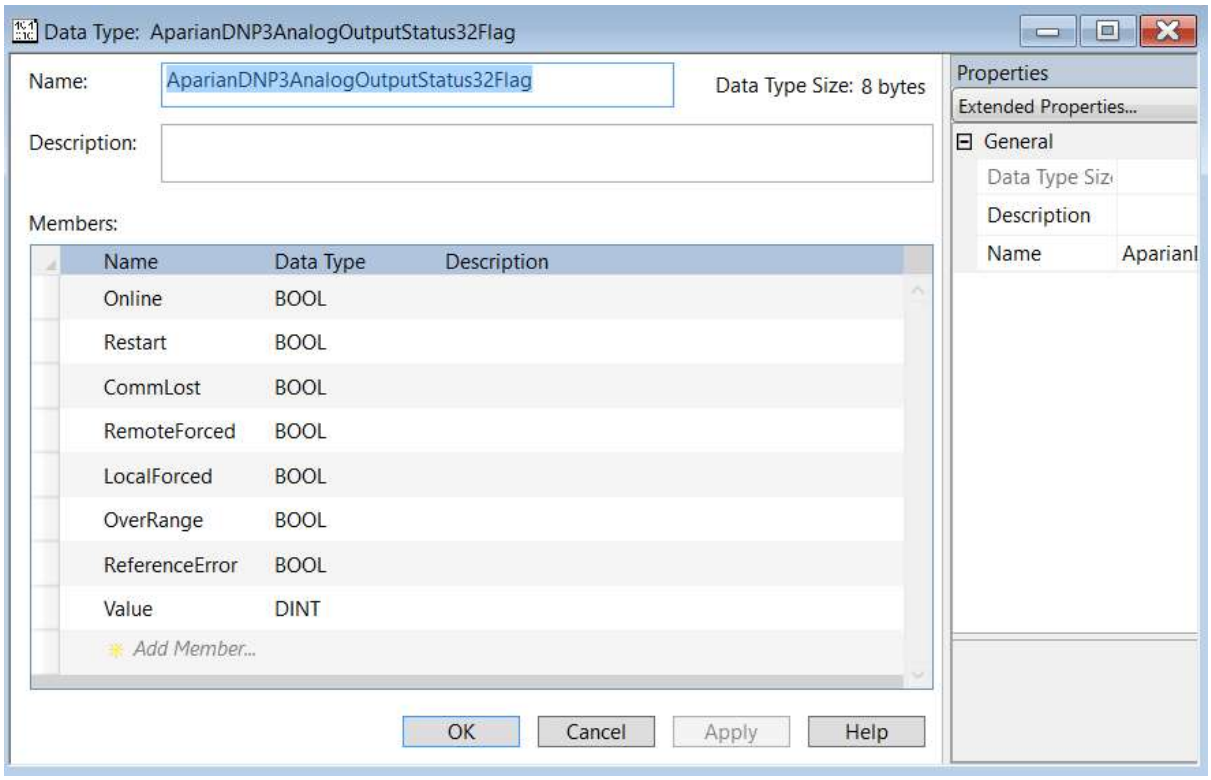



FIGURE 3.14 - DNP3 ANALOG OUTPUT STATUS GROUP VARIATION 1

Below is the UDT for variation 2. The status for the Analog Output Status is provided in the first 7 bits with the actual Analog Output value found in the INT (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* INT to change the Analog Output value.

NOTE: The updating of these values will be discussed in the DNP3 Commands section.

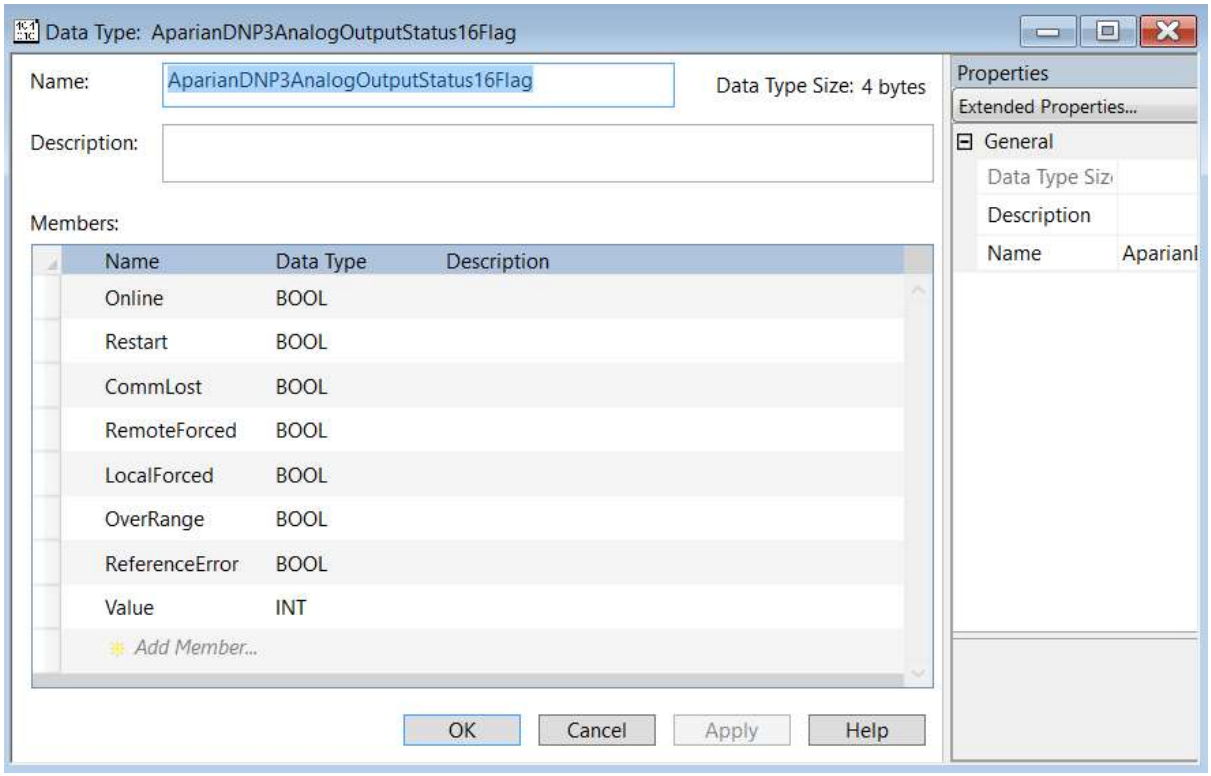



FIGURE 3.15 - DNP3 ANALOG OUTPUT STATUS GROUP VARIATION 2

Below is the UDT for variation 3. The status for the Analog Input is provided in the first 7 bits with the actual Analog Output value found in the REAL (*Value*). For normal operation the user will need to set the Online bit in the status flags to indicate to the DNP3 Master that the element is active and the update the *Value* REAL to change the Analog Output value.

NOTE: The updating of these values will be discussed in the DNP3 Commands section.

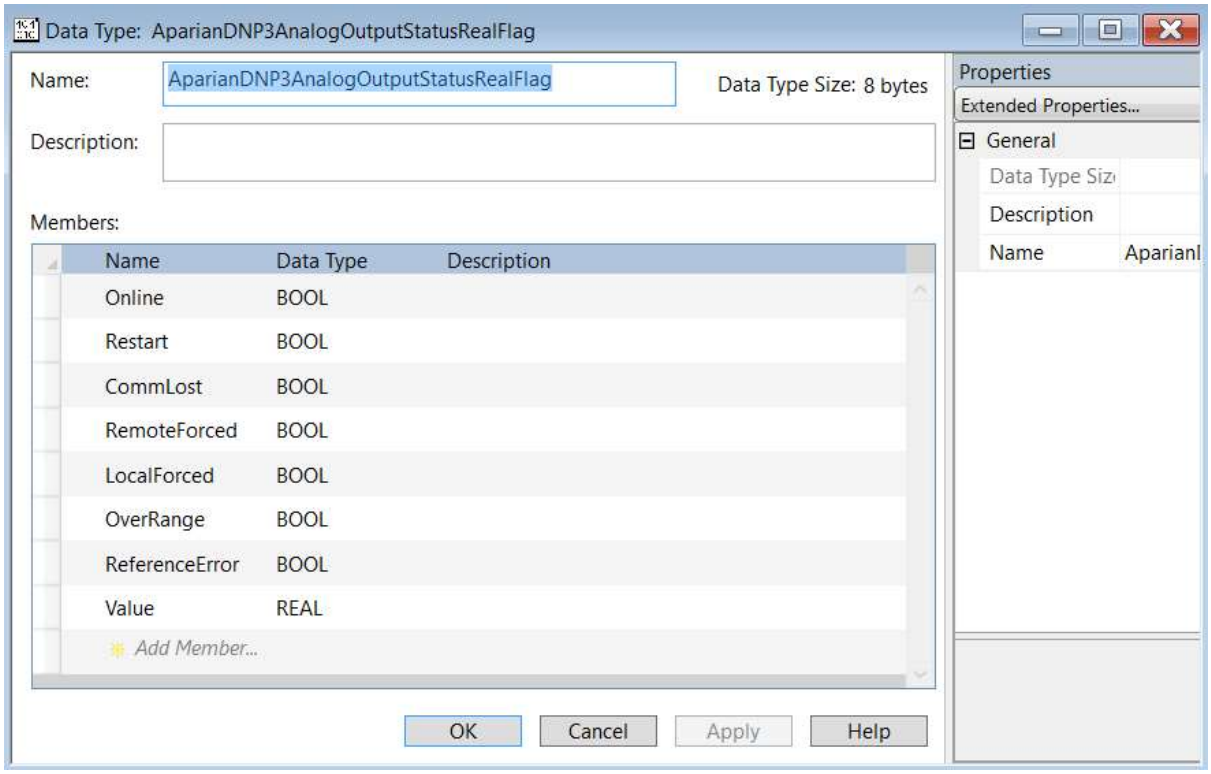



FIGURE 3.16 - DNP3 ANALOG OUTPUT STATUS GROUP VARIATION 3

## 3.3. DNP3 COMMANDS

DNP3 supports various commands to instruct a DNP3 Outstation to perform a certain action. In this section three commands will be discussed. Binary/Analog commands are used by the DNP3 Master to "write" output values to an Outstation. The Freeze command is used by the DNP3 Master to instruct the Outstation to freeze its counter values.

### 3.3.1. BINARY OUTPUT COMMAND – CONTROL RELAY OUTPUT BLOCK (CROB)

Binary Output values are updated using the Control Relay Output Block (CROB) command. This command allows the outstation to switch on, switch off, pulse on, or pulse off a specific binary output. A Logix UDT will be used to receive the CROB command after which the Logix code will need to decide what action must be taken.

NOTE: The UDT used for the CROB command does not store the status of the output, but rather acts as a vehicle for the output command. When the DNP3 Master wants to read the actual output value, G10 Binary Output Status is used. Thus the Logix code will need to use the command received in the CROB UDT to determine how to update the Binary Output Status UDT.

Refer to the Logix example code for an implemented example.

Below is the UDT for variation 1 (CROB). Each time a command is received the *RequestPending* bit will be set indicating to the Logix code a new command has been received. The user will need to then use the Control Code to determine what action must be taken.

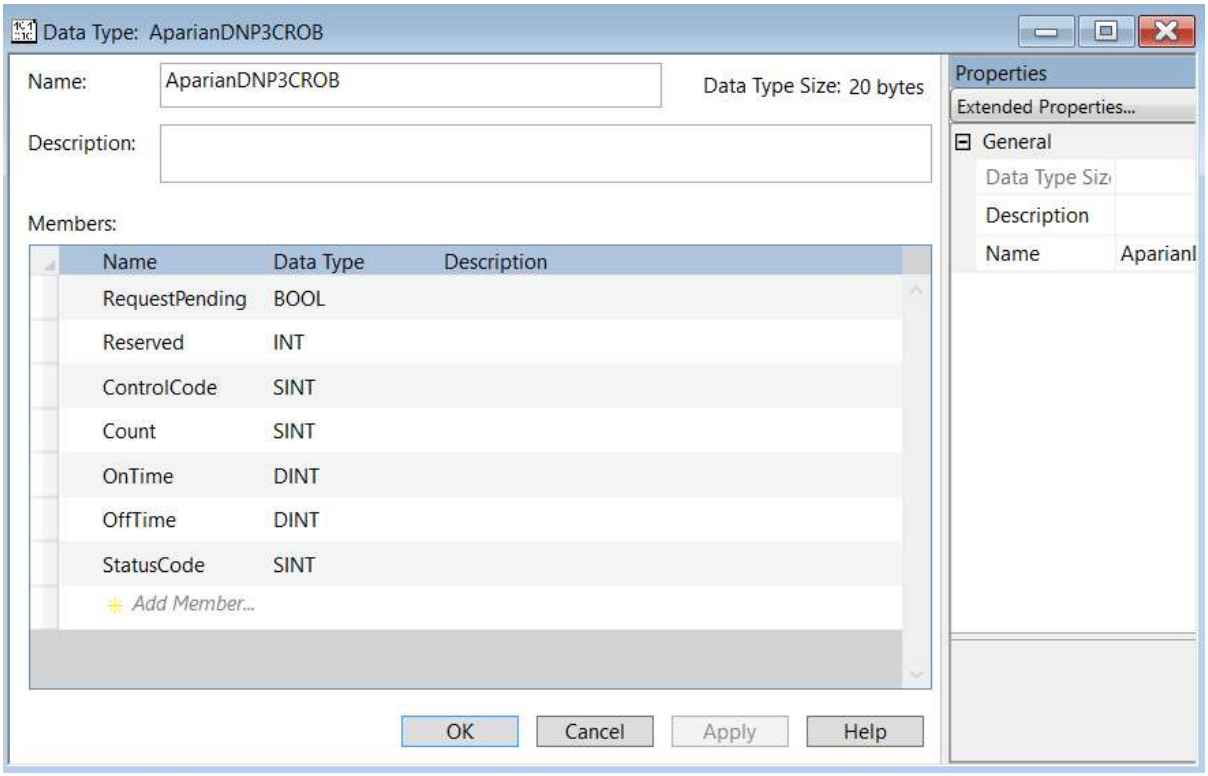



FIGURE 3.17 - DNP3 CROB GROUP VARIATION 1

Below is a table of the control codes that can be received:

| Control Code | Description |
|---|---|
| 0 | NUL |
| 1 | Pulse On |
| 2 | Pulse Off |
| 3 | Latch On |
| 4 | Latch Off |

TABLE 3.8 - DNP3 CROB CONTROL CODES

If a Latch On or Latch Off commands is received the equivalent Binary Output Status value must be updated. This will allow the DNP3 Master to do a readback and ensure that output value was correctly updated. For example, if a CROB is received for index 5 then the 5$^{th}$ element in the Binary Output Status UDT must be modified.

The Count, OnTime, and OffTime elements are only used when there is a pulse command (1 or 2). The count is the amount of pulses that must be executed whilst the OnTime and OffTime is the relevant duty cycle. Refer to the Logix example code for an implemented example.

Once the needed action has been taken the Logix code must clear the *RequestPending* bit to allow for the detection of a new command.

### EXAMPLE CODE - CROB

The referenced example code provides an AOI (Add on Instruction) that processes the CROB command. An instance of this AOI is required for each Binary Output point.

The AOI will control the mapped Binary Output, processing and valid Latch On, Latch Off, Pulse On or Pulse Off command.
Each time a valid CROB command is requested, the associated request count will be incremented. These counts can be cleared by setting the *ResetStatistics* input.

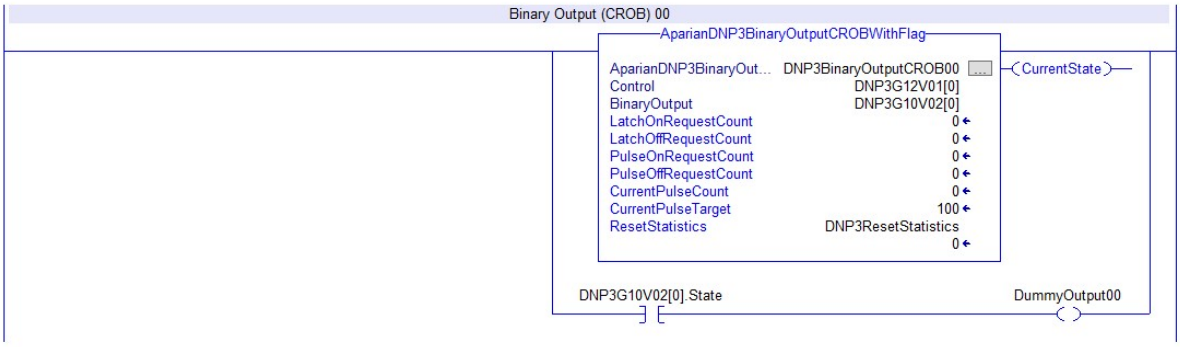



FIGURE 3.18 - CROB AOI EXAMPLE

## 3.3.2. ANALOG OUTPUT COMMAND

Similar to Binary Output Commands the Analog Output Command is used by the DNP3 Master to update a specific Analog Output value. A Logix UDT will be used to receive the Analog Output command after which the Logix code will need to decide what action must be taken.

NOTE: The UDT used for the Analog Output command is just used as a method to determine what action to take. When the DNP3 Master wants to read the actual output value, G40 Analog Output Status is used. Thus the Logix code will need to use the command received in the Analog Output UDT to determine how to update the Analog Output Status UDT.

Refer to the Logix example code for an implemented example.

Analog Output command has three variations as shown in the table below:

| Group | Group Description | Var. Code | Variation Description | Recommended Data Type |
|---|---|---|---|---|
| 41 | Analog Outputs | 1 | 32-bit | AparianDNP3AnalogOutput32 |
| | | 2 | 16-bit | AparianDNP3AnalogOutput16 |
| | | 3 | Single Floating Point | AparianDNP3AnalogOutputReal |

TABLE 3.9 - DNP3 ANALOG OUTPUTS GROUP VARIATIONS

Below is the UDT for variation 1. Each time a command is received the *RequestPending* bit will be set indicating to the Logix code a new command has been received. The user will need to then use the Status and Value fields to determine what action must be taken.

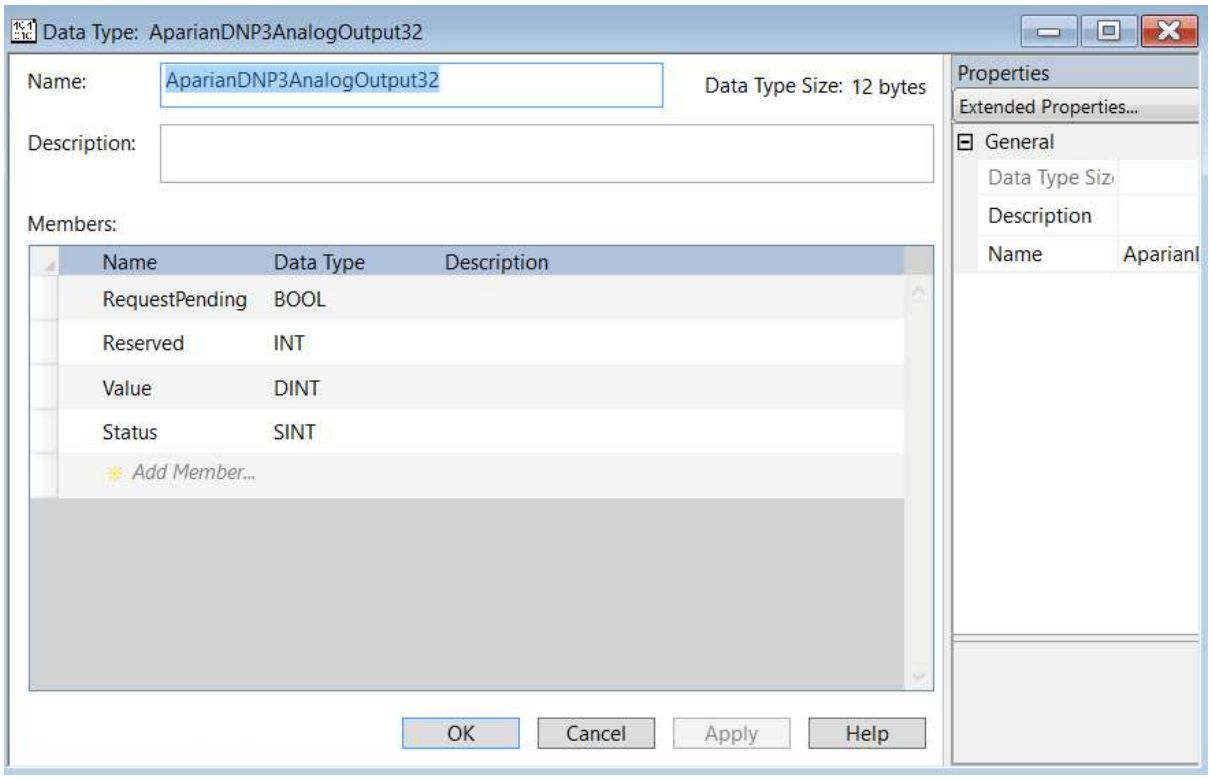



FIGURE 3.19 - DNP3 ANALOG OUTPUTS GROUP VARIATION 1

If a value other than zero is received in the Status field the Command must be discarded. If a value of zero is received in the Status field, then the *Value* (DINT) must be used as well as copied to the correct Analog Output Status UDT. This will allow the DNP3 Master to do a readback and ensure that output value was correctly updated. For example, if an Analog Output command is received for index 7 then the 7$^{th}$ element in the Analog Output Status UDT must be modified.

Once the needed action has been taken the Logix code must clear the *RequestPending* bit to allow for the detection of a new command.

Below are the UDTs for variation 2 and 3. These UDTs must be used in the exact same was as described above for variation 1.

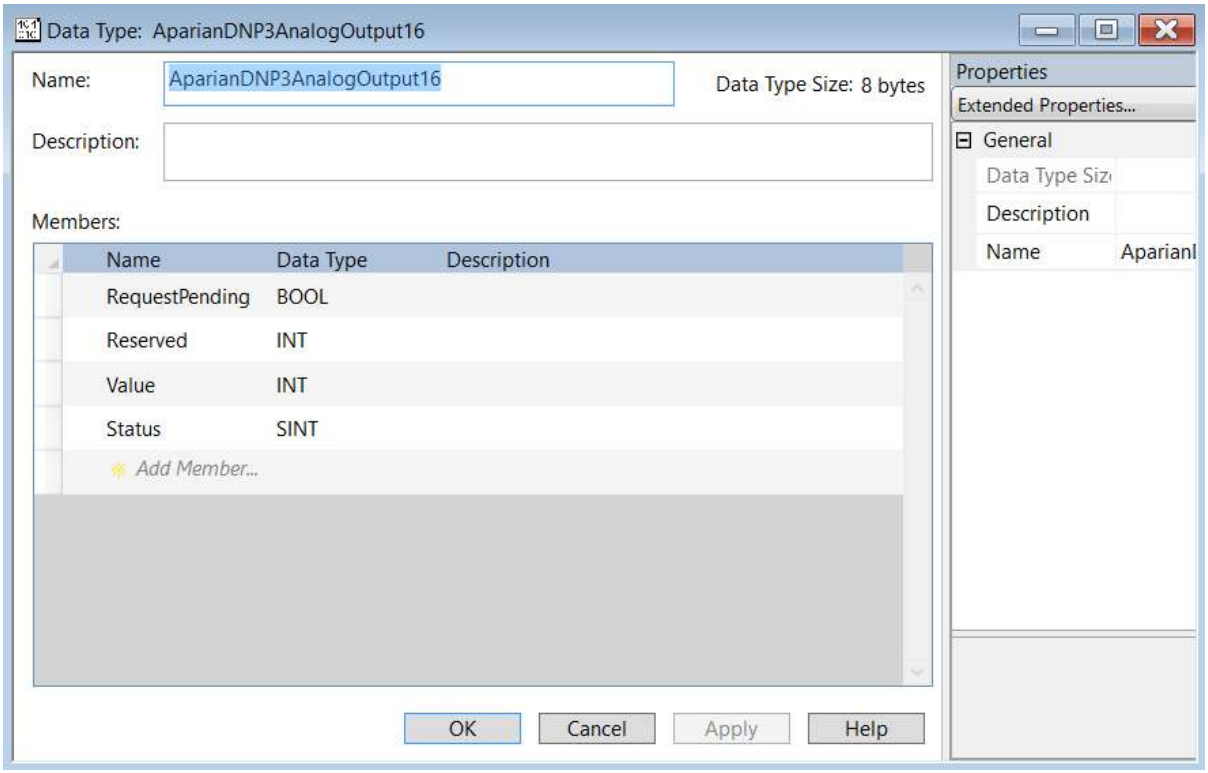



FIGURE 3.20 - DNP3 ANALOG OUTPUTS GROUP VARIATION 2

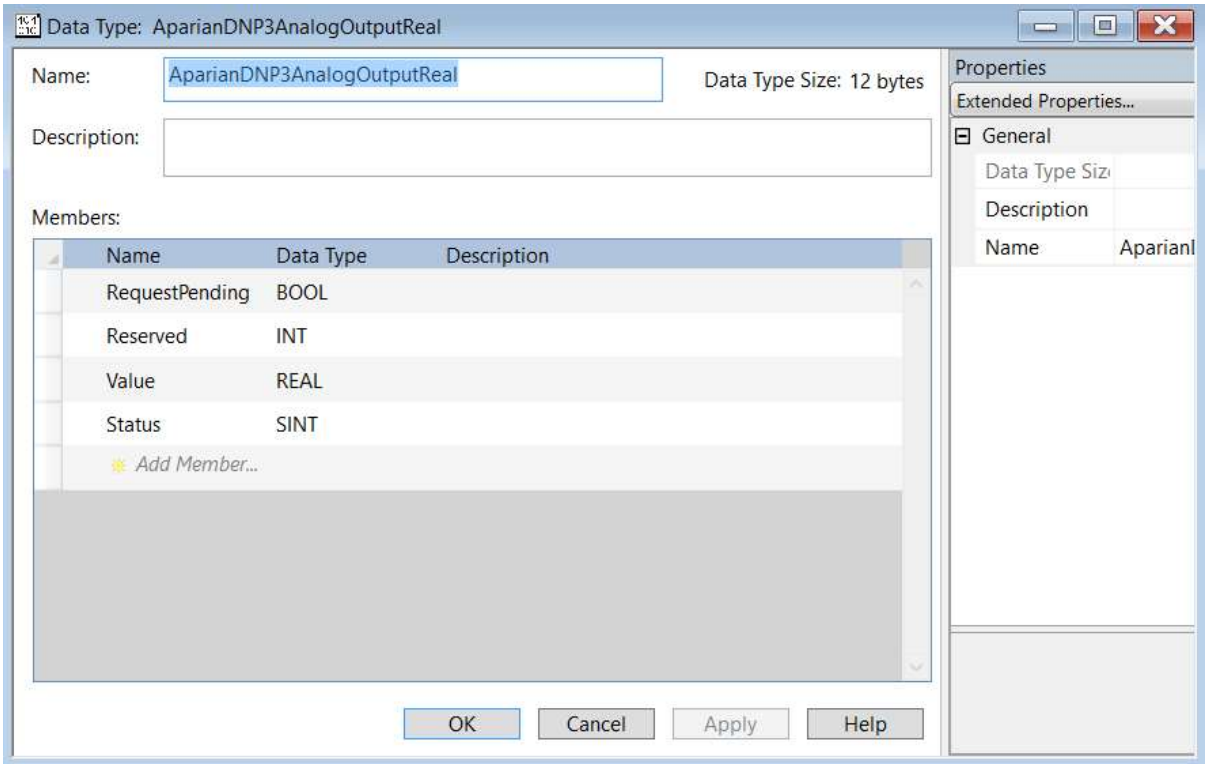



FIGURE 3.21 - DNP3 ANALOG OUTPUTS GROUP VARIATION 3

EXAMPLE CODE - ANALOG OUTPUT

The referenced example code provides an AOI (Add on Instruction) that processes the Analog Output command. An instance of this AOI is required for each Analog Output point.

The AOI will receive the Analog Output command and copy the result to the mapped Analog Ouput.

Each time a valid Analog Output command is requested, the associated request count will be incremented. This count can be cleared by setting the *ResetStatistics* input.

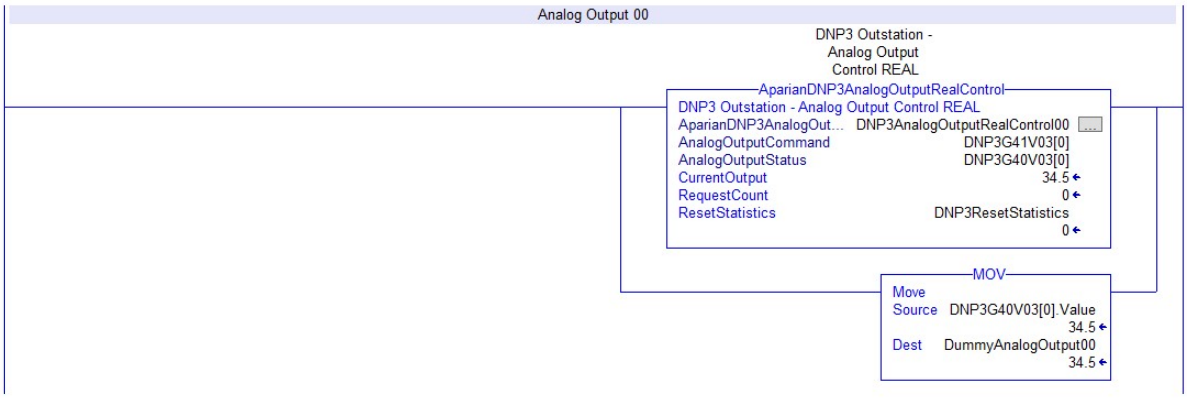



FIGURE 3.22 - ANALOG OUTPUT AOI EXAMPLE

### 3.3.3. FREEZE COMMAND

The DNP3 Master has the ability to freeze the counters (Group 20) in an outstation by using the Freeze Command. The Freeze informs the Outstation that all or a range of DNP3 Counters must be Frozen and moved to the Frozen Counter Objects (Group 21). The DNP3 Master can also inform the Outstation that once the Counter has been frozen the actual counter value must be cleared.

Once a Freeze command is received the DNP3 Router will update a Counter Control UDT which will inform the Logix code that the current values in the Counter UDTs must be copied to the Frozen Counter UDTs and if the Counter UDTs must be cleared once the instruction has been executed.



**NOTE:** The Control Tag must be named identical to that of the DNP3 Counter Tag used with the addition of “Ctrl” at the end. Thus if the DNP3 Counter tag being used is called *ErrorCounter* then the Freeze Control Tag must be called *ErrorCounterCtrl* for the freeze command to operate correctly. The user must also ensure that the dimensions of the two tags are of the same size.

Below is an example of the Counter Control Pair:

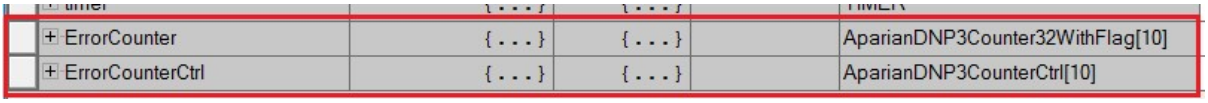



FIGURE 3.23 - FREEZE COMMAND PAIR

The Counter Control UDT is shown below:

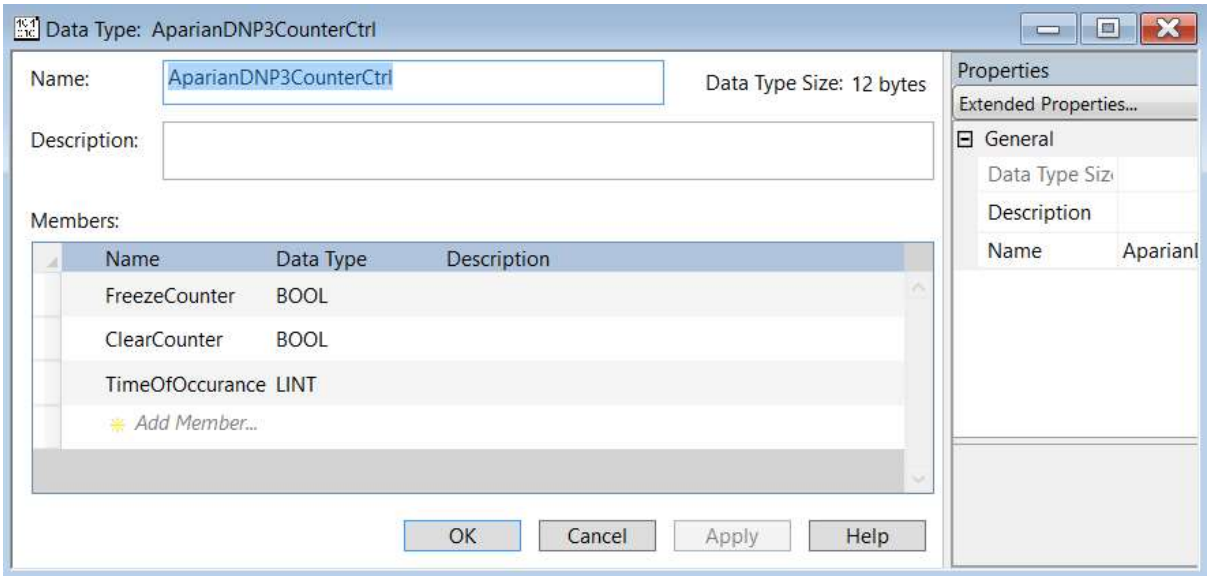



FIGURE 3.24 - FREEZE COMMAND CONTROL UDT

The Control Tag will either have the Freeze bit or Freeze and Clear bits set to indicate to the Logix controller that the counter values must be copied to the DNP3 Frozen Counter Group tags and if the Counter must be cleared afterwards. Refer to the Logix Example code for an example of how this is done. The time of occurrence is the DNP3 time (Unix time in milliseconds) when the freeze command was received. This must be copied to the DNP3 Frozen Counter Group tag as well.

### EXAMPLE CODE – COUNTER CONTROL (FREEZE AND CLEAR)

The referenced example code provides an AOI (Add on Instruction) that processes the Freeze and Clear Counter commands. An instance of this AOI is required for each Counter object.

The AOI maps the Counter and Frozen Counter values and processes the Counter Commands. When receiving a Clear command, the Counter value is set to zero, and the ClearAction Boolean output is pulsed for a single scan. This output can be used to clear an external Logix Counter if required. The ClearRequest counter is also incremented for monitoring purposes.

When receiving a Freeze command, the Counter value is copied to the associated Frozen Counter value, and the FreezerAction Boolean output is pulsed for a single scan. The DNP3 TimeOfOccurrence value from the Control word is also copied to the Frozen Counter object for future reporting. The FreezeRequest counter is also incremented for monitoring purposes.

This FreezeRequestCount and ClearRequestCount can be cleared by setting the *ResetStatistics* input.

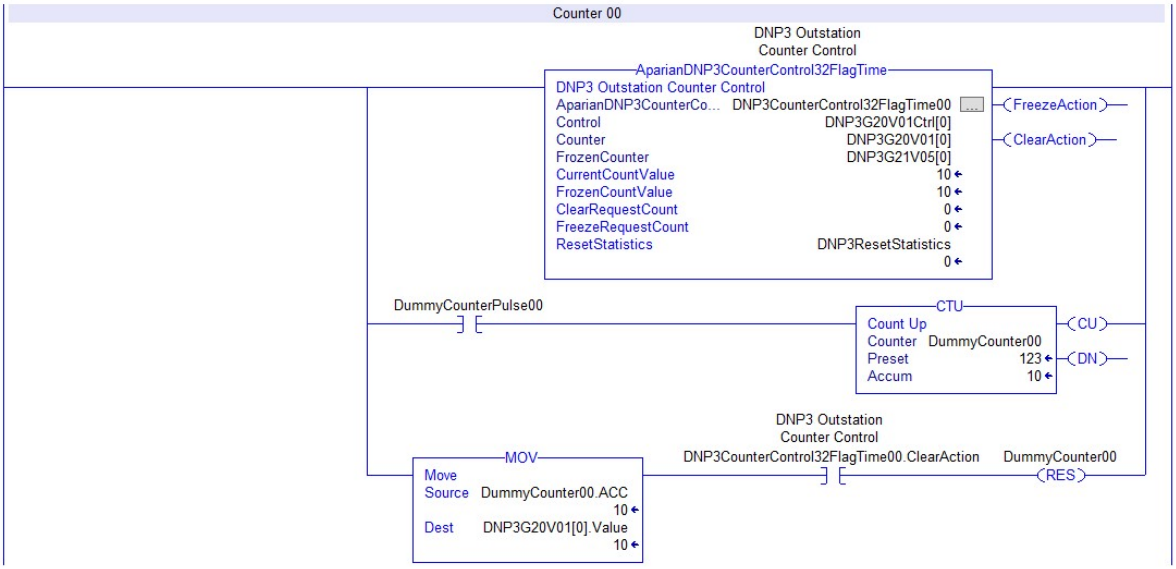



FIGURE 3.25 - COUNTER AOI EXAMPLE

## 3.4. DNP3 EVENTS

The DNP3 Router provides the ability to log various DNP3 elements and commands. The DNP3 module will manage all the time stamping, and logging of the event data. The following parameters are required for DNP3 Events.

| Parameter | Description |
|---|---|
| Enable Events | This parameter will enable or disable the DNP3 Event function for a specific set of DNP3 elements (configured in the same line item) |
| Event Variation | For each DNP3 Group there are various combinations of DNP3 Event variations that can selected. These event variations will be used to log the default event format for when default event requests are used. |
| Deadband (DB) | The deadband is used to determine when to log an event for Counters, Analog Inputs, and Analog Outputs Status. If the value changes by more than the deadband an event is logged with the specific DNP3 element's value. |

TABLE 3.10 - EVENT LOGGING PARAMETERS

NOTE: DNP3 elements will always be logged when any status bit changes (e.g. Online, Restart, etc.).

NOTE: When using Binary Groups (e.g. Binary Inputs, Double Binary Inputs, and Binary Output Status elements will be logged whenever there is a change in any value (status or process value).

NOTE: When using DNP3 Commands (e.g. Control Relay Output Block – CROB, or Analog Outputs) events will be logged when commands are received, rendering the deadband irrelevant.

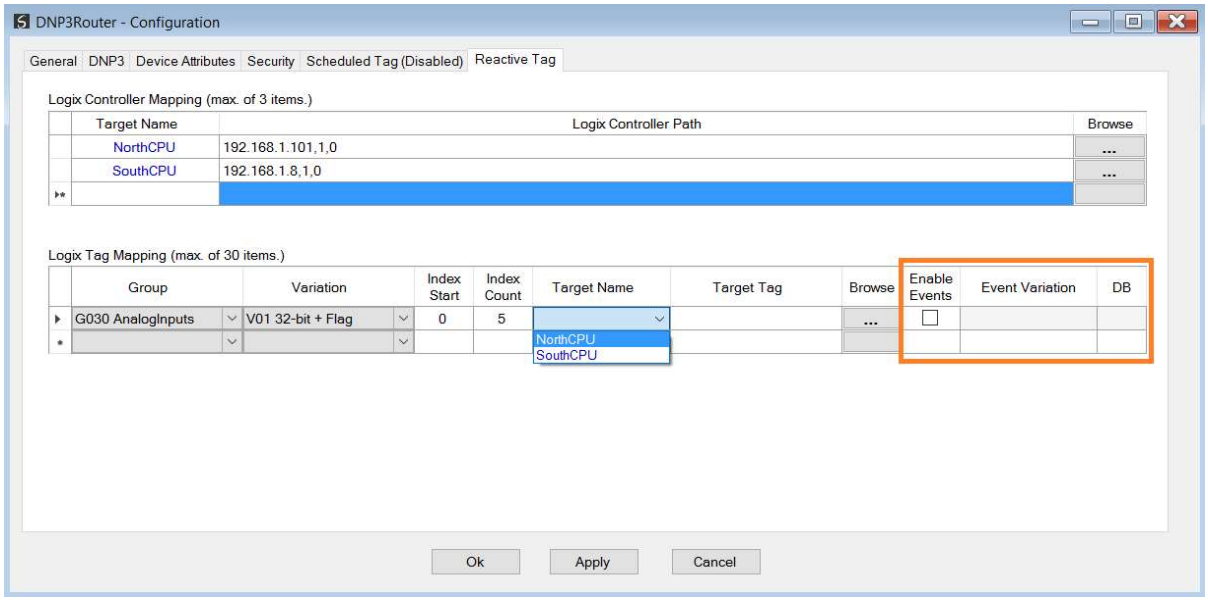



FIGURE 3.26 - DNP3 EVENT SELECTION

Each mapped line item will be read every 10ms from the Logix controller. If a mapped line item is sufficiently big the reading of all the elements in the mapped line item will be spread over multiple Logix controller reads.

A maximum of 100,000 events can be logged per DNP3 Group.

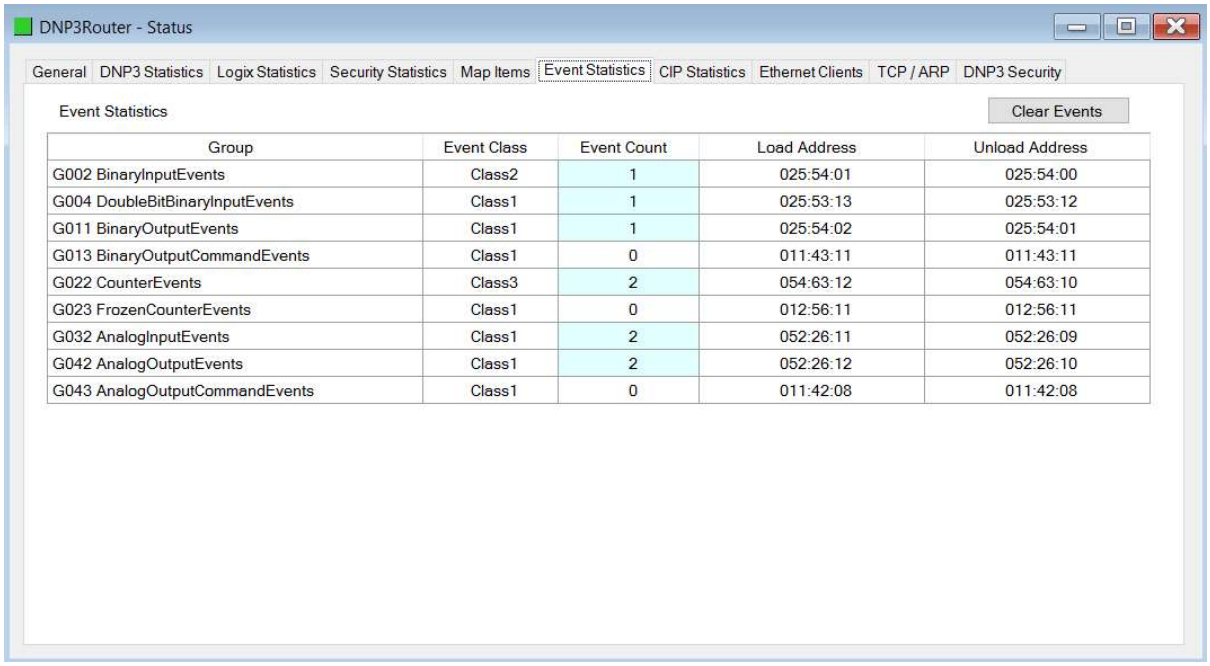



FIGURE 3.27 - EVENT STATISTICS

### 3.4.1. EVENT VARIATION

For each DNP3 Group there are various combinations of DNP3 Event variations that can be selected. These event various will be used to log the default event format for when default event requests are used.

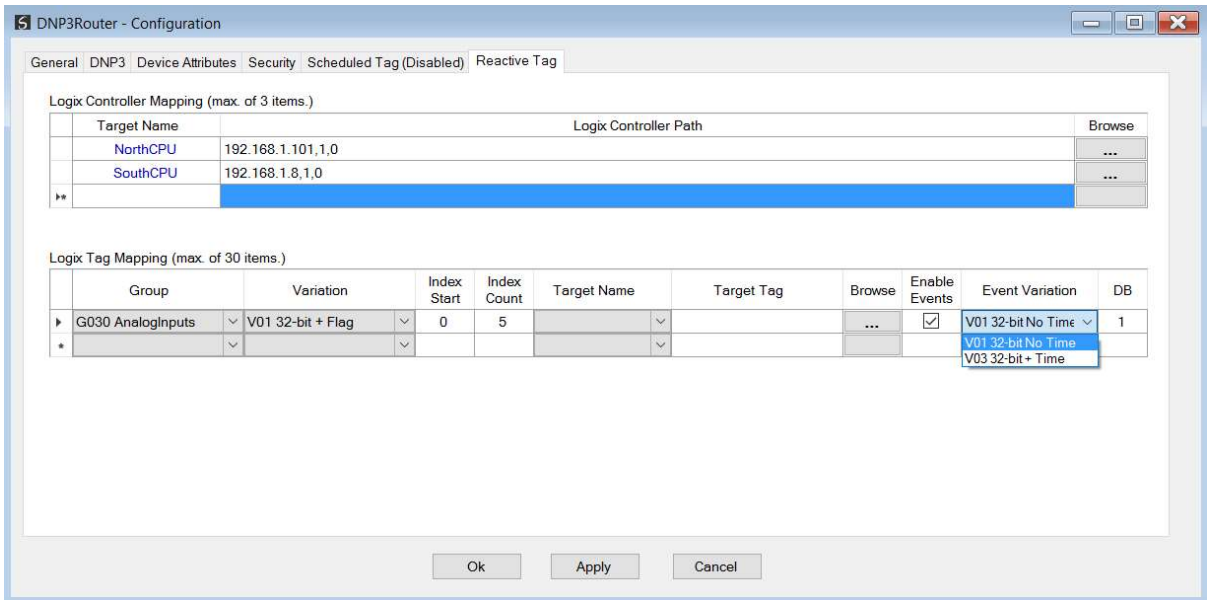



FIGURE 3.28 - DNP3 EVENT VARIATION SELECTION

### 3.4.2. DEADBAND

The deadband is used to determine when to log an event for Counters, Analog Inputs, and Analog Outputs Status. If the value changes by more than the deadband an event is logged with the specific DNP3 element's value.

### 3.4.3. UNSOLICITED RESPONSES

The DNP3 Router supports Unsolicited Responses for DNP3 Events. The module will default to Unsolicited Responses disabled after power up. Unsolicited Responses can be enabled by the DNP3 Master.

## 3.5. OUTSTATION TIME NEEDED

The DNP3 Router (when in outstation mode) can be forced to set the Time Needed bit in the DNP3 indicators when responding to a request. This will inform the DNP3 Master that it must write the current time to the DNP3 Outstation. When the DNP3 Router powers up the Time Needed bit will by default be set. The Time Needed is force by using a CIP explicit message from Logix.

The message instruction should be setup as follows:

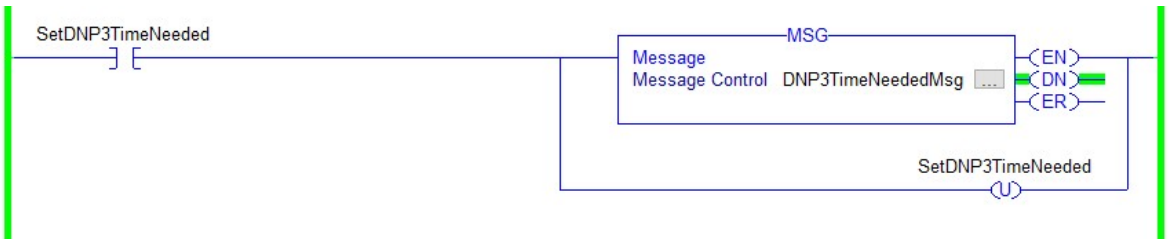



FIGURE 3.29 - MESSAGE INSTRUCTION

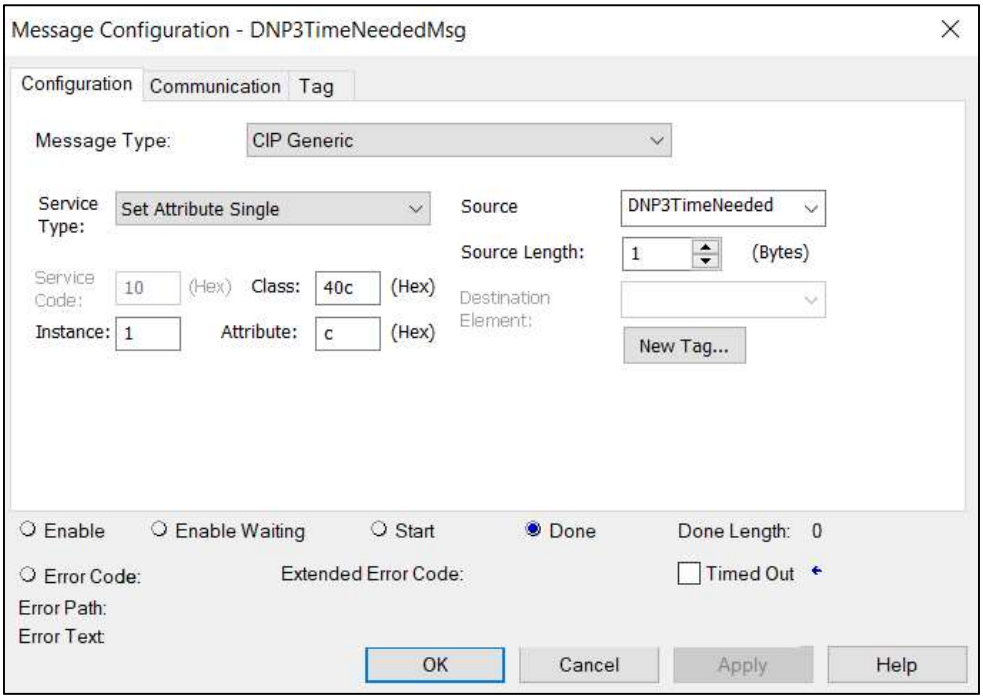



FIGURE 3.30 - MESSAGE CONFIGURATION

| Parameter | Description |
|---|---|
| Message Type | CIP Generic |
| Service Type | Custom |
| Service Code | 10 (Hex) – Set Single Attribute |
| Class | 40C (Hex) |
| Instance | 1 |
| Attribute | C (Hex) |
| Source Element | SINT |
| Source Length | 1 |
| Destination Element | None |

TABLE 3.11 - MESSAGE CONFIGURATION PARAMATERS

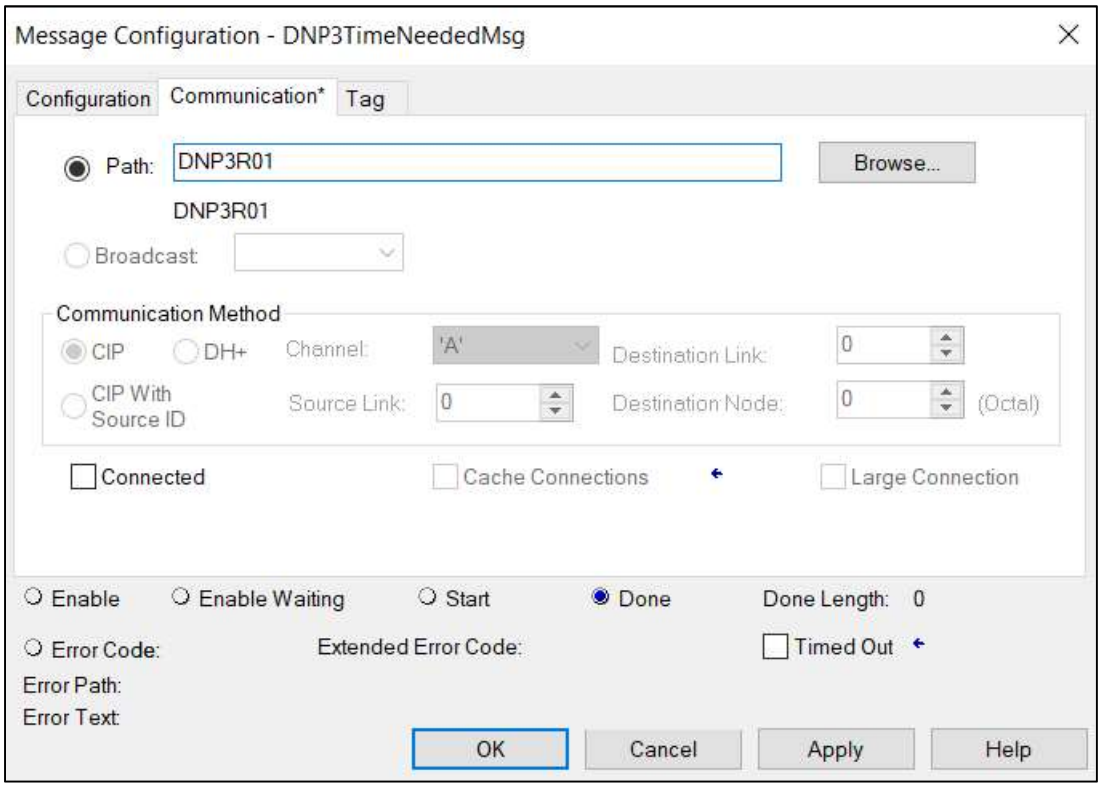



FIGURE 3.31 - MESSSAGE CONFIGURATION - COMMUNICATION

The Path must be configured to that of the DNP3 Router. If the DNP3 Router has been added in the I/O tree, then the Browse option can be used to select the path.
Alternatively, enter the CIP path in the format:

**1,X,2,IP** , where
1 represents the backplane port,
X represents the slot of the Ethernet bridge module,
2 represents the Ethernet port of the Ethernet bridge module and
IP represents the IP address of the DNP3 Router.
e.g. **1,1,2,192.168.1.41**

The request tag (e.g. ***DNP3TimeNeeded***) should be configures as follows:




Figure 3.32 - Unscheduled Message Request Tag

| Parameter | Description |
|---|---|
| DNP3TimeNeeded | 0 – Force the Time Needed bit in the DNP3 Indicators to **off**<br>1 – Force the Time Needed bit in the DNP3 Indicators to **on** |

TABLE 3.12 - UNSCHEDULED MESSAGE REQUEST PARAMETERS

# 4. NOTES

## 4.1. EXAMPLE RSLOGIX AND SLATE CODE

To assist the user an example RSLogix 5000 project as well as an example Slate project has been placed on the Aparian website. These two projects have been configured as a pair allowing the user to simply download both without additional work required.

## 4.2. DNP3 OUTSTATION GROUP VARIATIONS

| Group | Group Description | Var. Code | Variation Description | Recommended Data Type |
|---|---|---|---|---|
| 1 | Binary Inputs | 1 | Packed Format | SINT |
| | | 2 | With Flags | AparianDNP3BinaryInputWithFlag |
| 3 | Double Bit Binary Inputs | 1 | Packed Format | SINT |
| | | 2 | With Flags | AparianDNP3DoubleBinaryInputWithFlag |
| 10 | Binary Outputs | 1 | Packed Format | SINT |
| | | 2 | Output Status With Flags | AparianDNP3BinaryOutputWithFlag |
| 12 | Binary Output Commands | 1 | Control Relay Output Block | AparianDNP3CROB |
| 20 | Counters | 1 | 32-bit With Flag | AparianDNP3Counter32WithFlag |
| | | 2 | 16-bit With Flag | AparianDNP3Counter16WithFlag |
| | | 5 | 32-bit Without Flag | DINT |
| | | 6 | 16-bit Without Flag | INT |
| 21 | Frozen Counters | 1 | 32-bit With Flag | AparianDNP3Counter32WithFlag |
| | | 2 | 16-bit With Flag | AparianDNP3Counter16WithFlag |
| | | 5 | 32-bit With Flag And Time | AparianDNP3Counter32WithFlagTime |
| | | 6 | 16-bit With Flag And Time | AparianDNP3Counter16WithFlagTime |
| | | 9 | 32-bit Without Flag | DINT |
| | | 10 | 16-bit Without Flag | INT |
| 30 | Analog Inputs | 1 | 32-bit With Flag | AparianDNP3AnalogInput32Flag |
| | | 2 | 16-bit With Flag | AparianDNP3AnalogInput16Flag |
| | | 3 | 32-bit Without Flag | DINT |
| | | 4 | 16-bit Without Flag | INT |
| | | 5 | Single Floating Point With Flag | AparianDNP3AnalogInputRealFlag |
| 40 | Analog Output Status | 1 | 32-bit With Flag | AparianDNP3AnalogOutput32Flag |
| | | 2 | 16-bit With Flag | AparianDNP3AnalogOutput16Flag |
| | | 3 | Single Floating Point With Flag | AparianDNP3AnalogOutputRealFlag |
| 41 | Analog Outputs | 1 | 32-bit | AparianDNP3AnalogOutput32 |
| | | 2 | 16-bit | AparianDNP3AnalogOutput16 |

| | | | | |
|---|---|---|---|---|
| | | 3 | Single Floating Point | AparianDNP3AnalogOutputReal |

TABLE 4.1 - DNP3 OUTSTATION GROUP VARIATIONS