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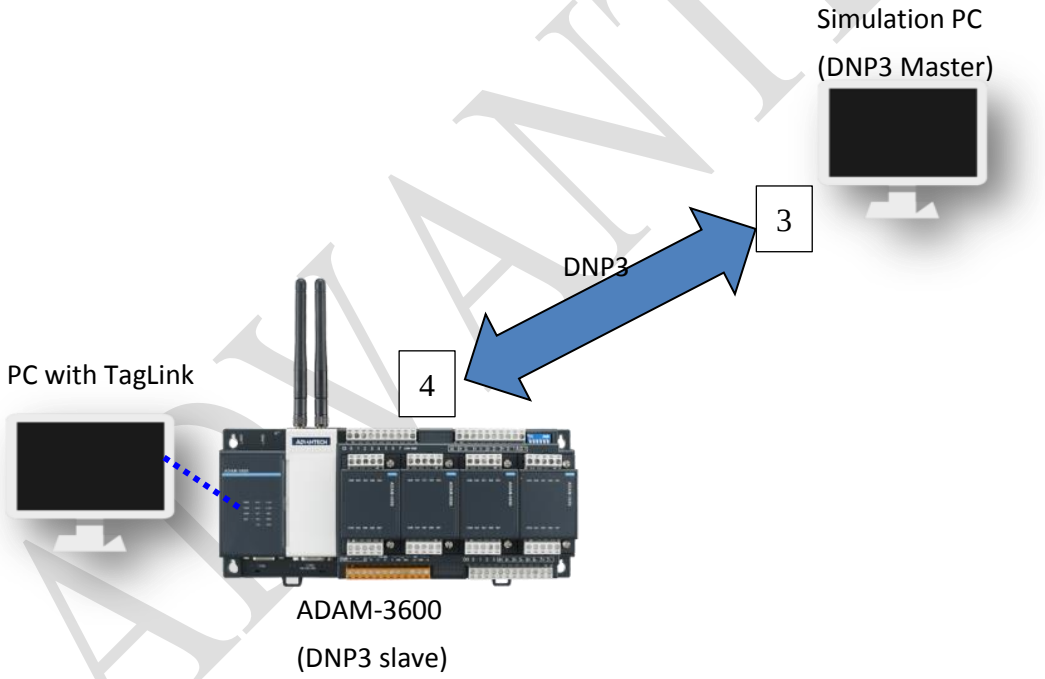
Category	■FAQ □SOP	**Related OS**	N/A
Abstract	How to use DNP3 protocol to inquire tag from ADAM-3600		
Keyword	TagLink Studio, DNP3, protocol, service		
Related Product	ADAM-3600		

■ **Problem Description:**

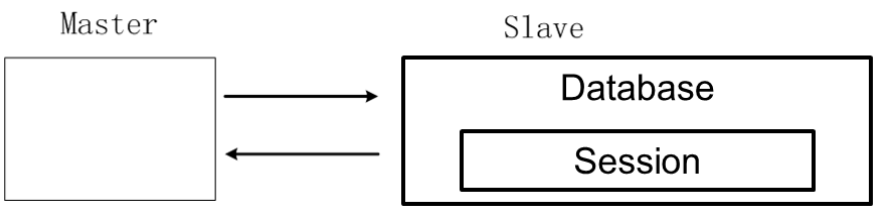
This document demonstrates how to use DNP3 protocol to inquire tag from ADAM-3600 as DNP3 slave step-by-step. The concept of DNP3 and terminology are also introduced in this document.

■ **Answer:**

The system architecture with DNP3 protocol is illustrated as bellow drawing.

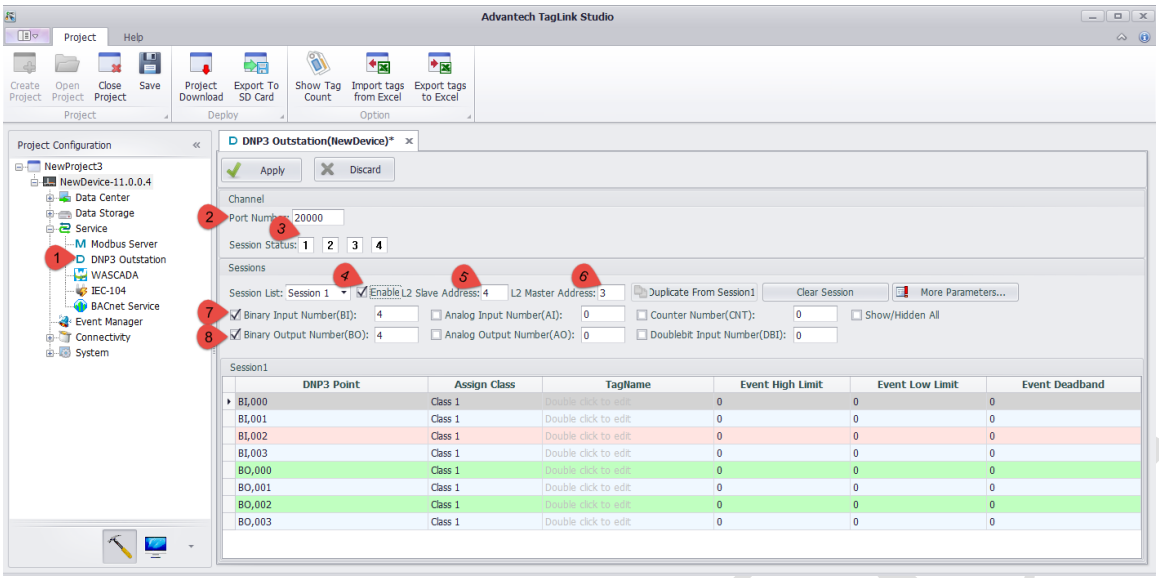


ADAM-3600 acts as DNP3 *Slave*, which would allocate one Database and could be inquired by DNP3 *Master* (Simulation PC) by LAN port.

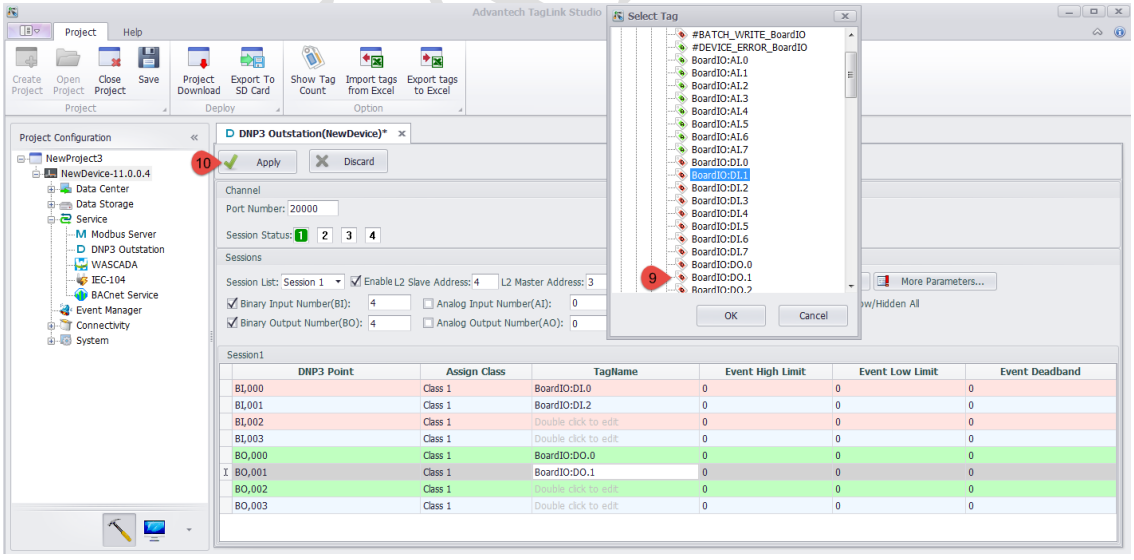


Each session includes 1 Slave ID and 1 Master ID. ADAM-3600 supports 4 sessions as DNP3 Slave.

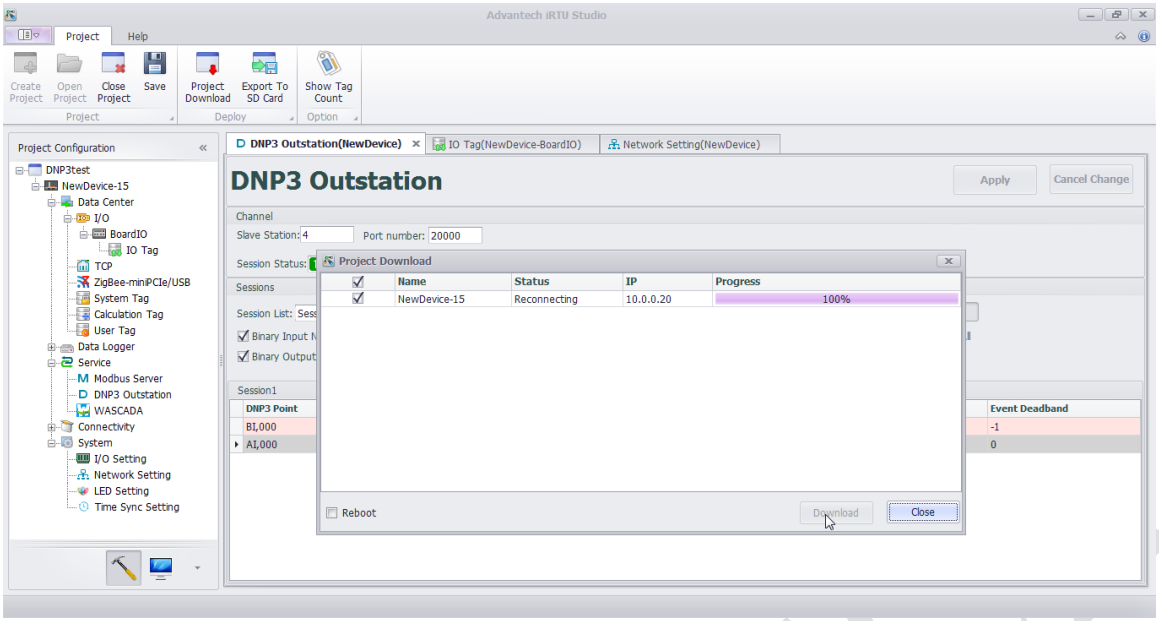
Settings in TagLink for DNP3



1. Double click on “DNP3 Outstation”
2. Use the default port as 20000
3. Select Session
4. Enable this session
5. Slave Address is for iRTU ADAM-3600. We set it as “4” for Slave.
6. Master Address is for simulation PC. We set it as “3” for Master.
7. Set the number of I/O Tags you want to monitor
8. In this demo, we use DO to control the tag value.



9. Select the I/O Tags you want to monitor. Press OK.
10. Apply for the configuration changed.

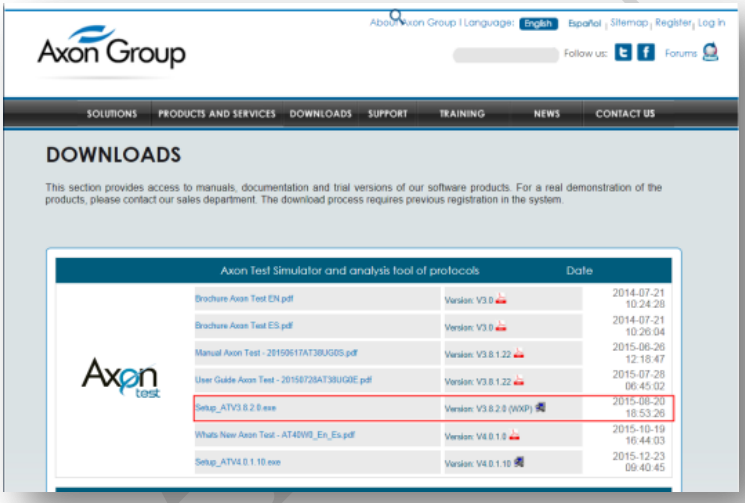


11. Download to iRTU. DNP3 service will start automatically after downloading.

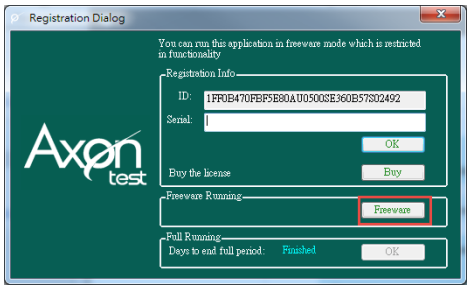
Settings in Simulation PC as DNP3 Master

In simulation PC, download and install software **Axon Utility**, which supports DNP3 protocol. (http://www.axongroup.com.co/axongroupen/axon_descargas.php.)

There are many options of software to choose, but we use Axon Utility to do the following demo.

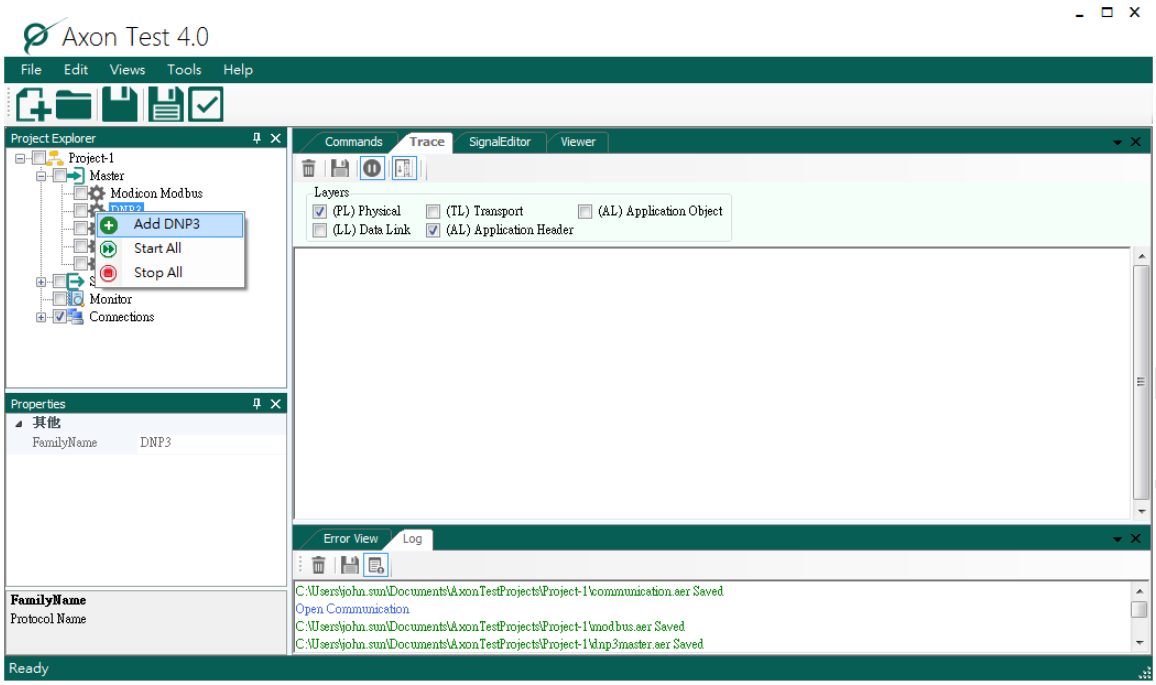


For Axon Utility, it may need registration to get permission of installation.



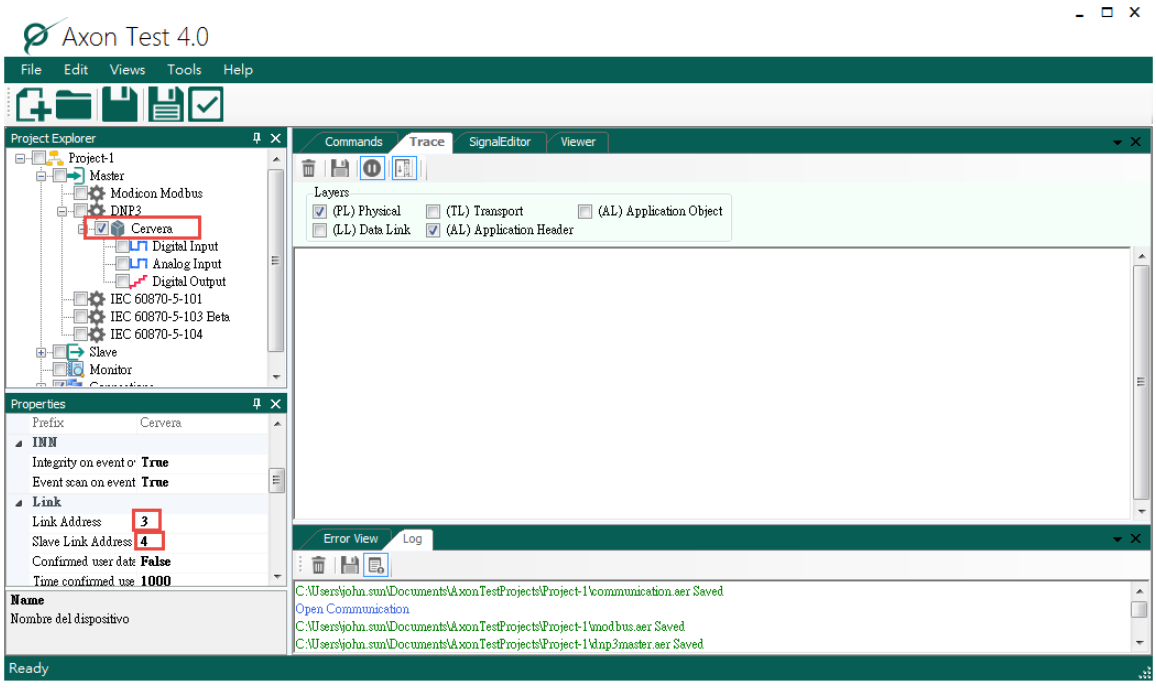
We could run Freeware License version after installation.

Using the Freeware version may need to wait to start. After the waiting, you may see below image.



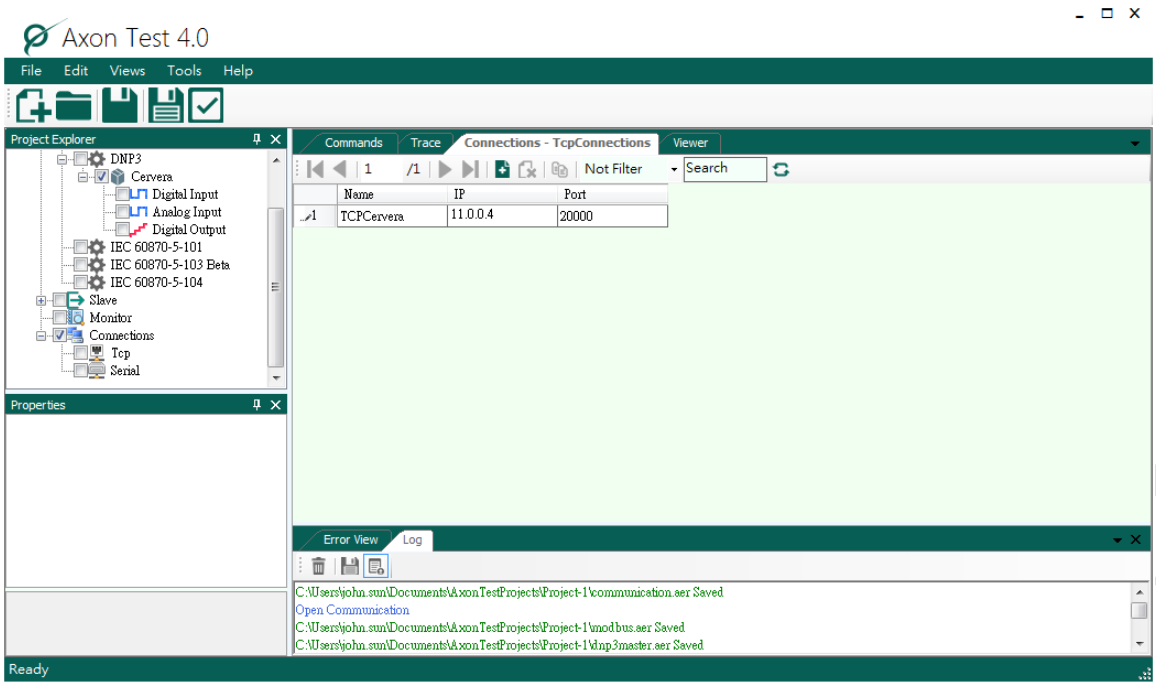
1. In project Explorer, right click on “DNP3” in the “Master” zone.

2. Choose “Add DNP3”.

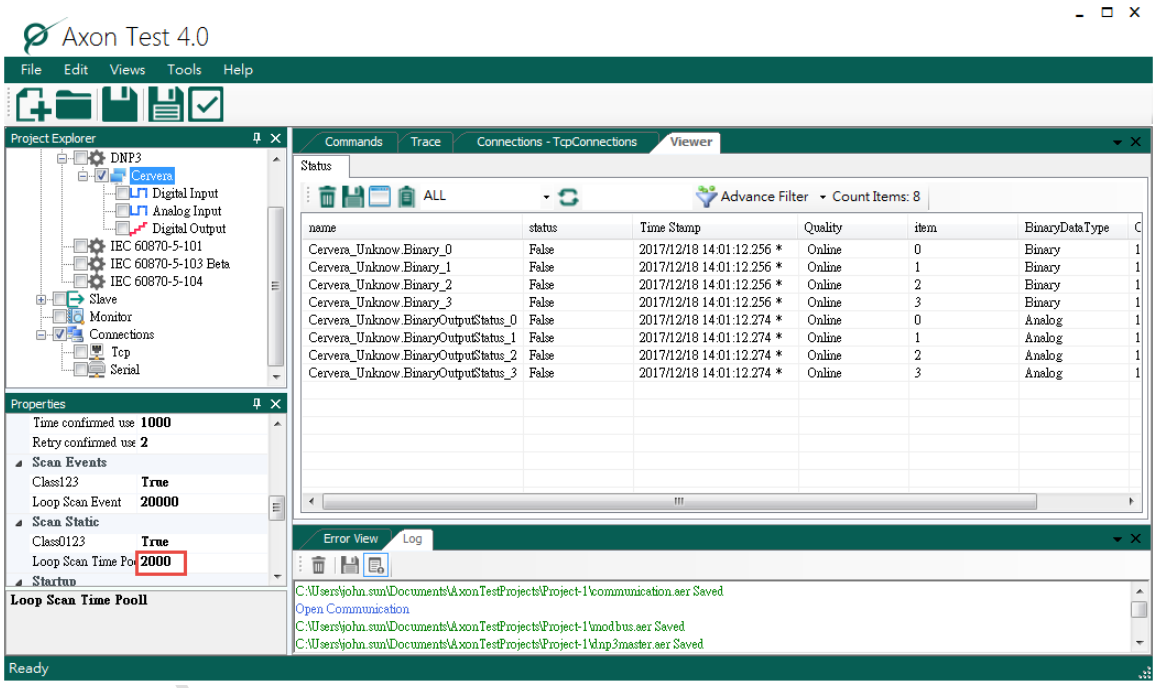


3. After add DNP3, a random given name will show up, ex. “Cervera”.

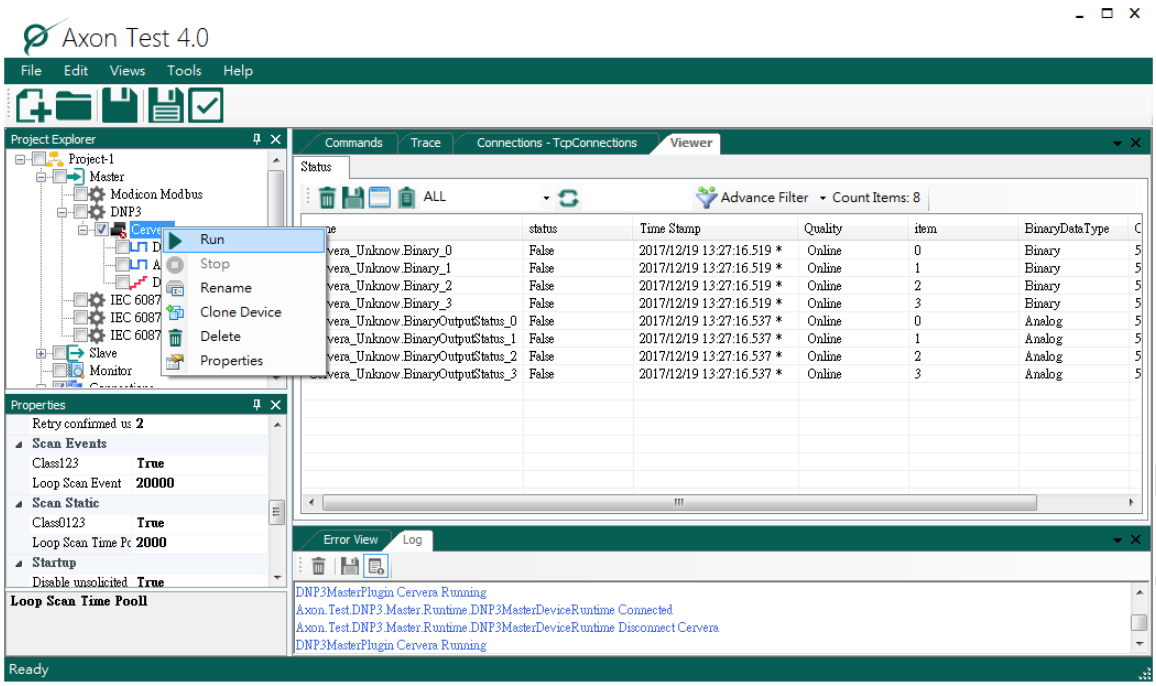
4. Scroll down in Properties, edit “Link Address” as “3” (Master) and “Slave Link Address” as “4” (Slave).



5. Double click on “Tcp” in “Connections”. Edit the IP same as the IP of ADAM-3600.

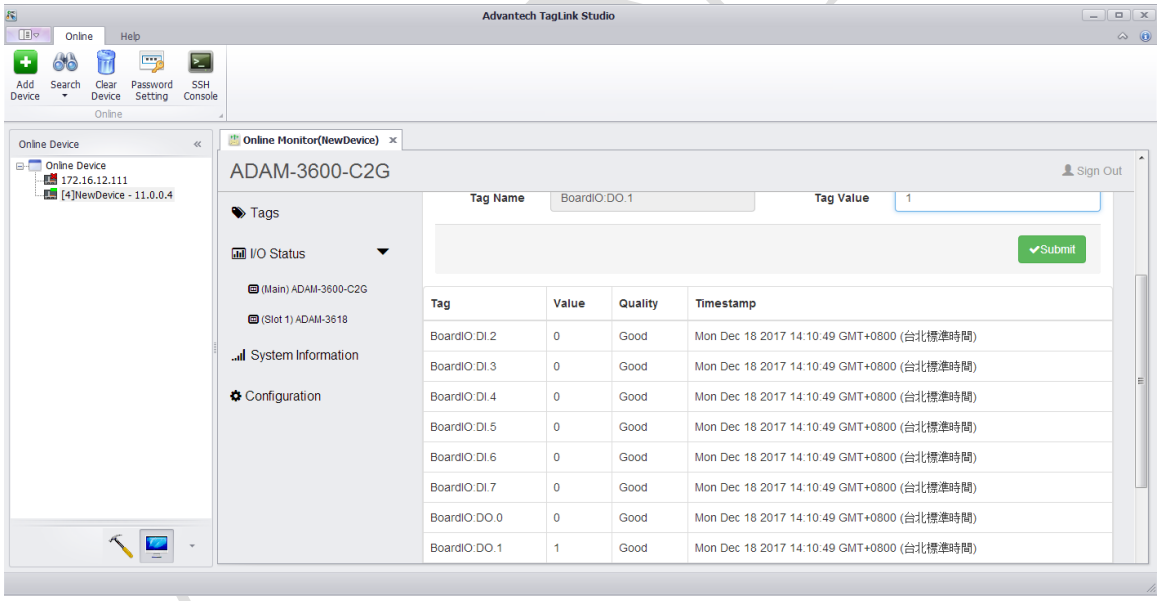


6. Edit the scan time in Properties. In “Scan Static”, edit “Loop Scan Time Poll” as “2000” milliseconds. It makes the Master to inquire data every 2 seconds.

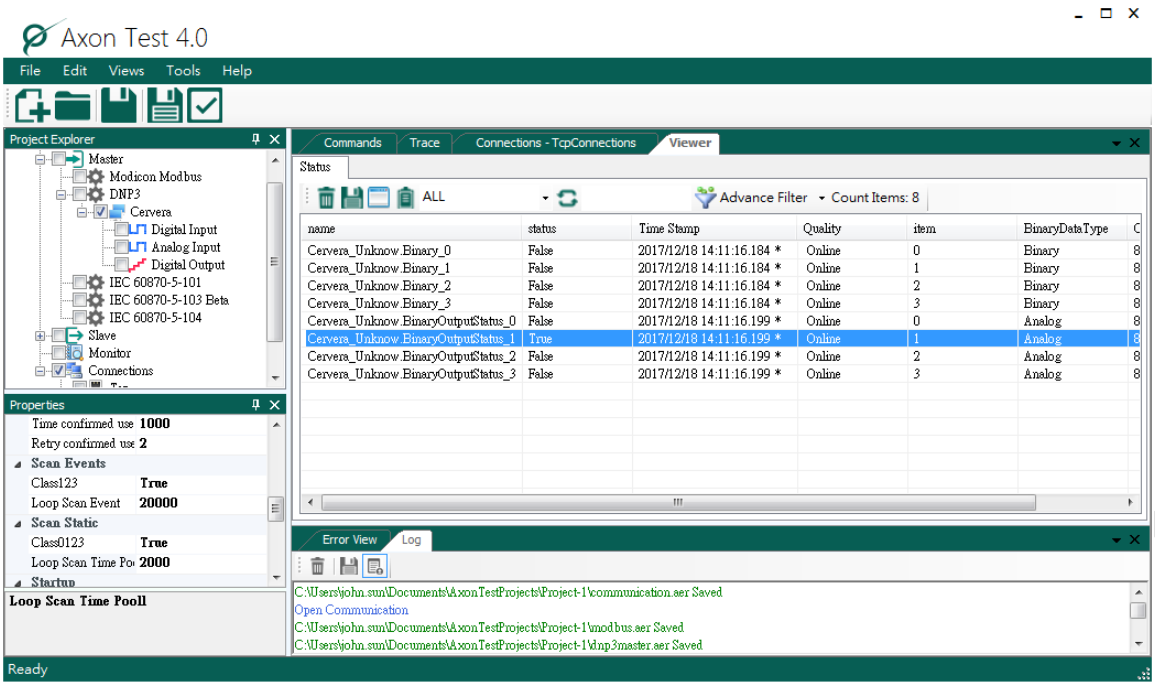


7. Right click on the random name of DNP3 Master. Run it.

8. After running, you may switch to "Viewer" to check the status.



9. For demonstration to monitor the value, you may change the DO 1 Tag value manually from 0 to 1 in TagLink.



10. After the value is changed, you may monitor the status of BinaryOutputStatus from False to True in "Viewer".

Terminology

There are several terms defined in DNP3, and we introduce it one-by-one as belows.

For data inquiry, there are 2 terms "**Static**" and "**Event**" are used in DNP3.

"**Static**" represents current value of the monitored data.

"**Events**" are associated with something of significance happening. User can define events, such as measured value changes, a measurement whose value crosses one threshold, and analog input changing by more than its **deadband**.

There are two methods commonly used for detection of analog input events based on a **deadband**.

- **Fixed Deadband:** If the absolute value of the difference between the present value of an analog input point and the value that was most recently queued as an event for that point exceeds the deadband value, then an event is generated for that point.
- **Integrating Deadband:** The difference between the present value of an analog input point and the value that was most recently queued as an event for that point is integrated over time. An event is generated when the absolute value of the integral exceeds the deadband value.

Event includes following information, Type of event (analog input, binary input, etc), Value, Point Index, Time when event occurred, Class assignment.

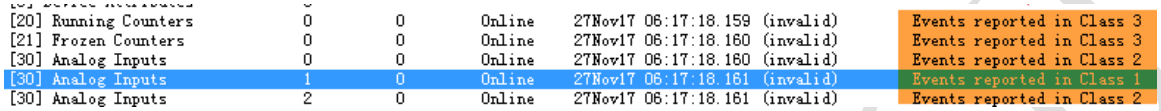
DNP3 uses the concept of "**Classes**" to organize static data and events into several categories:

- **Class 0:** Static data
- **Class 1,2,3:** Events

The points of most data types may be assigned to one of the four classes.

If a point is assigned to **Class 0**, the point's *present value* shall be reported by the outstation in its response to a **Class 0** poll.

If a point is assigned to one of the event classes (**Class 1, 2, or 3**), the outstation shall store and report events for that point, and the point's present value shall also be reported by the outstation in its response to a **Class 0** poll.



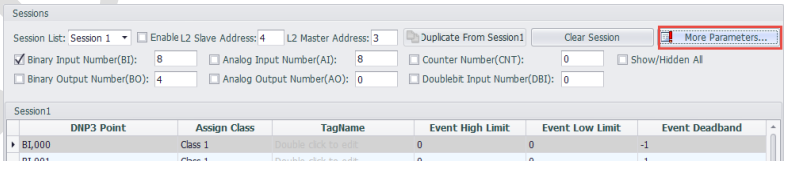
For example, if you want to monitor one specific Analog Input, you may classify it into Class 1. As a result, whenever the master wants to get the specific data from Analog Input, it may poll from class 1, instead of polling all data. If the master polls data from class 3, as the above image shows, the data of *Running Counters* and *Frozen Counters* will be reported.

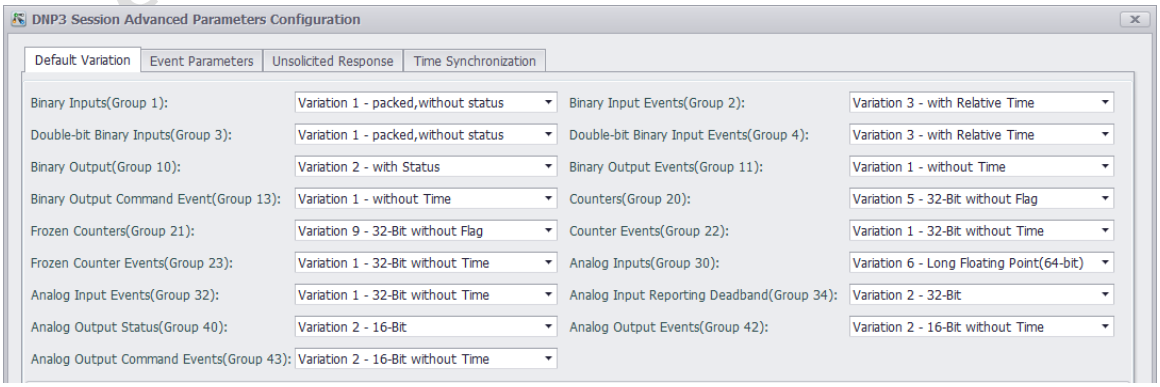
Classifying the event data is one bandwidth-efficient way to update a master each data, which we call **Event Poll**. Setting the master to poll a slave frequently for a given amount of time, especially when the number of events generated in slave is low, using classes for events can make slave returns much less data than if the master had to retrieve all data on every poll cycle.

Integrity poll is a combined poll of Class 0, 1, 2, and 3.

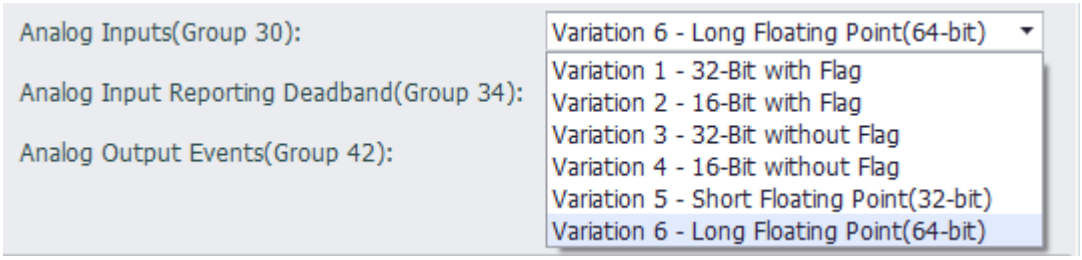
The setup of classes in slave can allows ADAM-3600 be configured in different classes and report Class 1, 2 or 3 spontaneously, which is called **unsolicited responses**.

DNP3 uses **Group** to indicate different data types. For example, Group 1 is Binary Inputs, Group 10 is Binary Outputs, and Group 30 is Analog Inputs. TagLink has followed DNP3 definition for each Group. User can view the configuration in "More Parameters" in TagLink.





Variation represents different data format in one Group. For example, in Group 30, variation 1 is defined as “32-Bit integer with Flag” format, and variation 6 is “64-Bit Floating point.”



DNP3 uses **Index** to distinguish different points’ values if they are in the same data type. For example, there are 5 AI points user wants to monitor.

Session1

DNP3 Point	Assign Class	TagName	
AI,000	Class 2	BoardIO:AI.0	← Index 0
AI,001	Class 2	BoardIO:AI.1	← Index 1
AI,002	Class 2	BoardIO:AI.2	← Index 2
AI,003	Class 2	BoardIO:AI.3	← Index 3
AI,004	Class 2	BoardIO:AI.4	← Index 4

The index 0 is given to AI.0 in TagLink automatically once user adds AI.0, and Index 1, 2, 3, 4 are given in an orderly way whenever user adds new points.

If DNP3 master wants to inquire AI.2, he needs to set Group 30 (AI), Variation 6 (64-Bit Floating point), and index 2 in the DNP3 master software.