

## Amazing New Firmware Update Adds P2P & GCL Functionality to ADAM-6000 Modules



Advantech has announced a new firmware update for ADAM-6000 series modules adding advanced Peer-to-Peer and Graphic Condition Logic (GCL) functionality. These new features have gone through extensive beta testing, and are proven to save time and money in all ADAM-6000 applications. Users can download the new firmware and updated manual from the B&B website. Hardware updates are not required to benefit from these new features. Don't waste time, upgrade now!

### Two Exciting New Features:

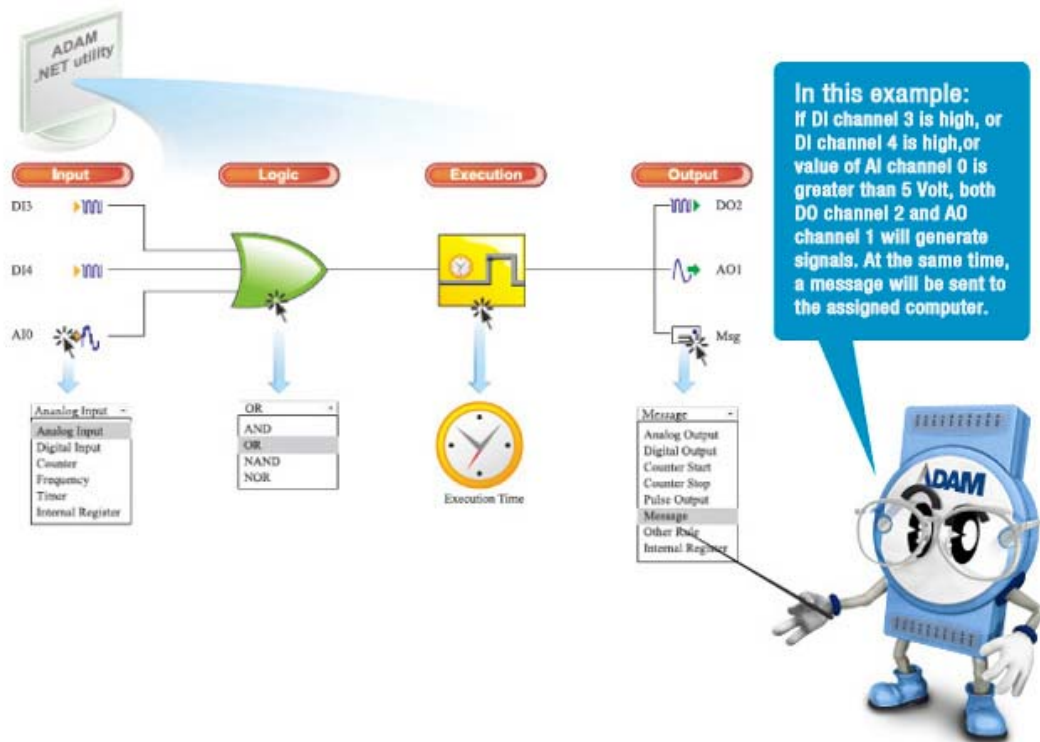
- 1. Peer to Peer:** With P2P functionality, the ADAM-6000 modules will actively update input channel status to specific output channels. In the past, a controller was required to read data from Ethernet input modules and send it to Ethernet output modules (without Peer-to-Peer). Now the data will transfer automatically, without an extra controller or programming.
- 2. Graphic Condition Logic:** GCL is a windows-based software utility that adds control logic between input and output without extensive programming. GCL easily creates code equivalent to simple ladder logic instructions on PLC's. It also supports a flexible logic cascade function, locally or over Ethernet network.

**ADAM-6000 Modules Compatible with Peer-to-Peer and GCL Firmware Update**

Product	Description
ADAM-6015	7-ch RTD Input Module
ADAM-6017	8-ch Analog Input with DO Module
ADAM-6018	8-ch Thermocouple with DO Module
ADAM-6024	12-ch Isolated Universal Input/Output Module
ADAM-6050	18-ch Isolated DI/O Module
ADAM-6051	16-ch Isolated DI/O with Counter Module
ADAM-6052	16-ch Isolated Source Type DI/O Module
ADAM-6060	6-ch Digital Input/Relay Module
ADAM-6066	6-ch Digital Input/Power Relay Module

## What is GCL?

**GCL (Graphic Condition Logic)** gives Ethernet I/O modules control ability. Users can define the control logic rules through a graphical configuration environment in the **ADAM.NET Utility**, and download these rules to a specific ADAM-6000 Ethernet I/O module. The module will execute the logic rules automatically, just like a standalone controller. Up to 16 logic rules can be defined for each Ethernet I/O module. While in the configuration environment of the utility, four graphic icons show the stages of one logic rule: Input, Logic, Execution and Output. (Refer to figure below). Users simply click on the icons to open a dialog box used to configure each stage. After completing the configuration, a simple click of a button downloads the rule to the specified Ethernet I/O module.

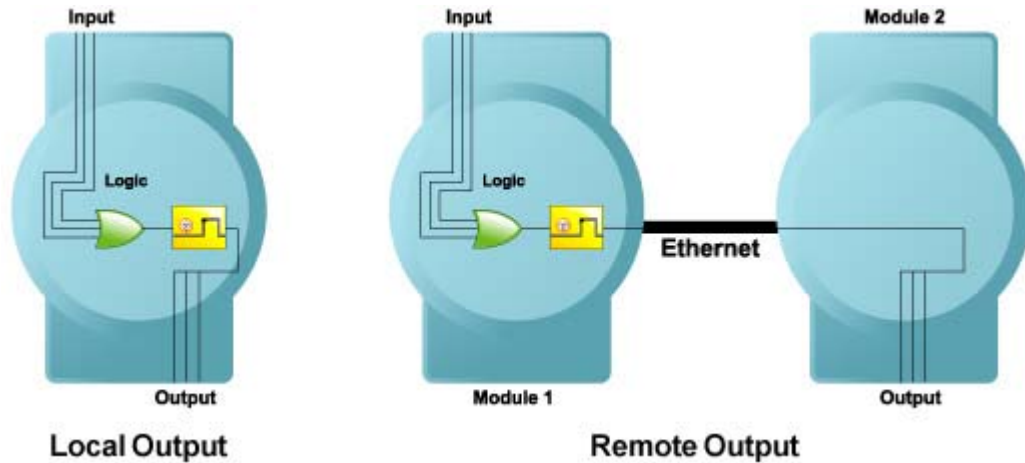


### Complete Graphical Configuration Environment

Unlike other text-based logic configuration utilities, Advantech's GCL provides a complete graphical configuration utility, which is very intuitive to use. By simply clicking the icons, all related configurations are set in a pop-up dialog window. GCL is not only easy-to-use, but is also features very powerful functionality.

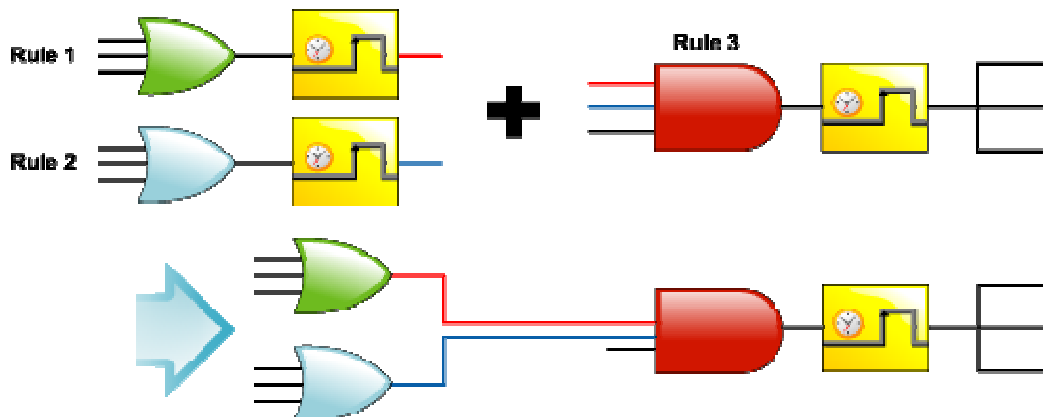
## Supports Both Local and Remote Output

When defining the destination of an Output stage (such as digital output, analog output, counter and pulse output), users choose either a local module or remote module as the target.



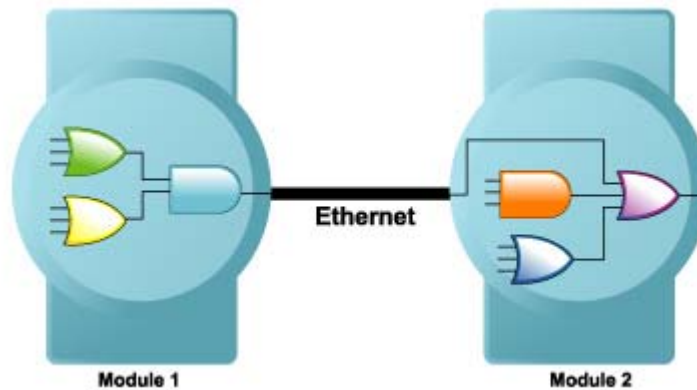
## Cascade Logic

Cascade Logic allows the output of one logic rule to be another rule, effectively combining them. When different rules are combined, more input numbers are created. For example, if you combine rule #1 and rule #2 with rule #3, the number of inputs is increased to 7. (Two inputs of rule #3 will be rule #1 and rule #2, see the figure below). This allows the user to define complex logical architectures to satisfy many application requirements.



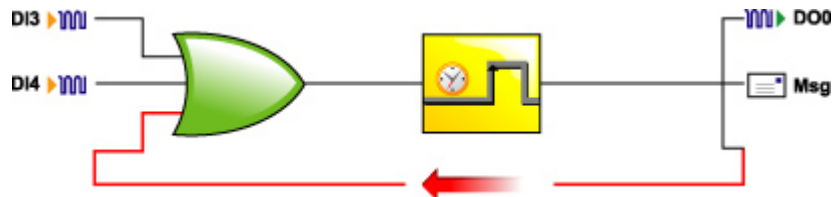
## Distributed Cascade Logic

Users can assign the output of a rule to be the output of another rule. The "Other Rule" can be on the same module, or on a different module. This function allows the architecture to operate across modules, creating a complete logic system and integrating many Ethernet I/O modules.



## Feedback Function

The inputs and outputs of logic rules can be assigned to the same internal register, allowing GCL feedback. Hardware wiring is not required. In the example below, the 3rd input and the 3rd output are mapped to the same internal register, so the output value will transfer back to the input.



## Rich I/O Options

Analog Input	Thermocouple, RTD, Voltage, Current
Analog Output	Voltage, Current
Digital Input	Dry Contact, Wet Contact, Counter/Frequency input
Digital Output	Sink, Source, Relay Output, Pulse Output

## Fast Processing Time

Advantech GCL features extremely short logic rule processing time. When users choose local outputs (output channel and input channel on the same module), the processing time (including hardware input delay time, one logic rule execution time and hardware output delay time) is less than 1 millisecond. If users choose remote output (output channel and input channel on different modules), the total time needed (including processing and communication time) is less than 3 milliseconds.

## Scaling (For Analog Input)

When configuring an analog input condition, GCL provides a linear scaling function to convert measured voltage/current value to its engineering unit value (such as temperature or pressure unit). The engineering unit value is then used to define the logic condition

## Online Monitoring

After completing GCL configurations in the ADAM.NET Utility, click the "Run Monitoring" button. This displays real-time execution logic rules and current input values on ADAM-6000 modules.

## Sending Messages

In GCL, you can set up a customized message. When the defined conditions are satisfied, a message including the module's IP address and I/O status is sent to a PC or other device.

## Local DO Status as Input Condition

In GCL, you can read a local DO channel status and use it as the input condition. This allows you to define logic rules based on local DO status



## What is Peer-to-Peer?

Unlike master/client mode, Peer-to-Peer enabled modules actively update input channel status to specific output channels. A pair of modules (one input and one output) is used. Users define the mapping between input channel and output channel. The input value is transferred to the output channel actively.

### A Controller is not Required

Ethernet I/O modules without Peer-to-Peer functionality require a controller to read data from the input module and send data to the output module. With the Peer-to-Peer solution, the controller is removed. This not only simplifies the process, but also saves system hardware costs.

### Programming is not Required

To utilize Peer-to-Peer modules, the only thing required is to configure related setting through ADAM .NET Utility. No additional programming is needed. This saves system development time.

### Simple and Flexible Wiring

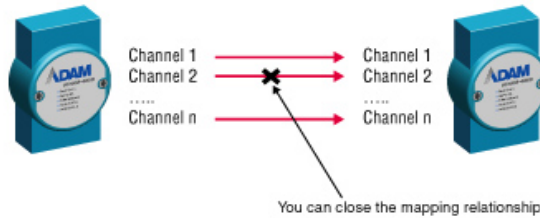
For some applications, the PLC and the sensors are located far away from one another. This requires an I/O module to be located near the sensors and a proprietary communications network to connect the PLC to the remote I/O. Distance can be severely limited. Moreover, networks provided by PLC manufacturers are rarely open. Peer-to-Peer modules can replace limited and closed networks without limitation because they leverage open and flexible Ethernet networks.



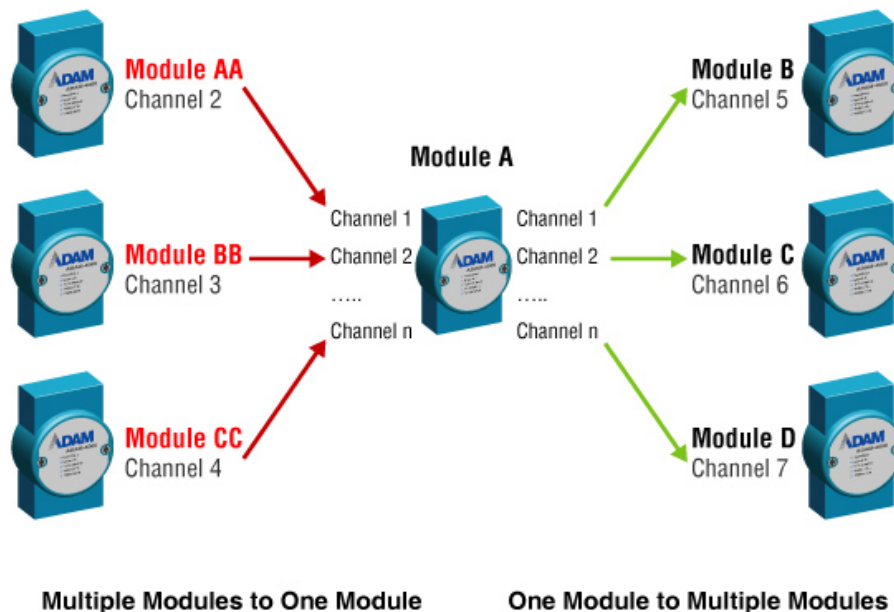
## Flexible Channel Mapping

ADAM-6000 Peer-to-Peer modules have two modes: Basic and Advanced. In Basic mode, channels on one input module are mapped directly to channels on one output module. In Advanced mode, channels on one input module are mapped to channels on several output modules. (Refer to figure below)

### ADAM-6000 P2P Mode: Basic Mode



### ADAM-6000 P2P Mode: Advanced Mode



## Fast Response Time

Advantech Peer-to-Peer modules feature excellent execution performance. For wired modules, the time to transfer data from input to output modules is less than 1.2 milliseconds. As for wireless modules, the execution time to transfer data from input to output modules will be less than 30 milliseconds (ad hoc mode).

## Simple Wireless Solutions

Advantech provides ADAM-6000W wireless Peer-to-Peer modules. Without wireless Peer-to-Peer modules, access points would be required for Peer-to-Peer functionality. Advantech wireless Peer-to-Peer solution helps you simplifying the system.

## Advanced Security

ADAM-6000 Peer-to-Peer modules allow the user to decide which IP or MAC address has control authority. This feature ensures that output modules are controlled only by their paired input modules.

## Reliability

If communication between a pair of ADAM-6000 Peer-to-Peer modules is lost, the digital output module can generate pre-defined value to ensure safety.



### Key Features of Peer-to-Peer and GCL

- No controller needed
- Active and real-time I/O messaging
- Proactive I/O event notification
- Easy graphic configuration environment, no programming needed
- Variety of I/O interface for Peer-to-Peer and GCL
  - ▶ Analog: Temperature (Thermocouple, RTD), Voltage, Current
  - ▶ Digital: Dry contact, Wet contact, Frequency input, Counter, Sink/Source output, Pulse output
- Complete Peer-to-Peer solution: Wired and Wireless modules
- High speed Peer-to Peer I/O : < 1.2 ms (Wired module) < 30 ms (Wireless module)
- High speed GCL for logic I/O: < 1 ms (local output, one rule)  
< 3 ms (remote output, one rule)
- GCL online monitoring and debugging
- GCL unique logic cascade architecture:
  - ▶ Combine different logic rules to fulfill more complex applications
  - ▶ Utilize logic cascade to have number of inputs as many as you want
- GCL unique logic feedback function
- GCL AI Scaling: convert to real-world engineer unit value
- Excellent reliability and security
- .NET class library programming

## Frequently Asked Questions

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Which ADAM-6000 modules support Peer-to-Peer (P2P) and GCL?



Module	P2P	GCL
ADAM-6015	YES	YES
ADAM-6017	YES	YES
ADAM-6018	YES	YES
ADAM-6024	*	*
ADAM-6050	YES	YES
ADAM-6051	YES	YES
ADAM-6052	YES	YES
ADAM-6060	YES	YES
ADAM-6066	YES	YES
ADAM-6050W	YES	NO
ADAM-6051W	YES	NO
ADAM-6060W	YES	NO

**\*NOTE: Only acts as a receiver and generates AO signals.**



Are there different part numbers modules with P2P and GCL functionality?



No. Take the ADAM-6050 for example, since it supports both P2P and GCL, you just need to purchase one ADAM-6050 module and choose which functionality is enabled. (You cannot enable P2P and GCL at the same time though.)

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Can I upgrade modules that I already have with P2P and GCL functionality?



Yes. To implement the P2P and GCL feature, all you need to do is install new firmware. The hardware design was NOT changed.

Note 1: To download the new firmware with P2P and GCL functionality to your ADAM-6000 module, your version of the ADAM.NET utility must be newer than 2.00.06.

Note 2: To use the web server on ADAM-6000 modules, remember download the web page files (.html and .jar files) after downloading the firmware itself (.bin file).



What software is needed to implement P2P and GCL on ADAM-6000 modules?



You just need to have the new version of firmware and ADAM.NET utility. You can download the new firmware to your ADAM-6000 module through the ADAM.NET utility. Then you can configure all related settings in the ADAM.NET utility.



Was the pricing for ADAM-6000 modules with upgraded firmware changed?



No. The price has not changed.



Where can I find the new firmware and ADAM.NET utility?



B&B Electronics' web site on the ADAM I/O product page



What version of firmware and ADAM.NET Utility support P2P and GCL?



To support P2P, the firmware should be newer than V 3.01

To support GCL, the firmware should be newer than V 4.01

On ADAM-6024 modules, the firmware should be newer than V 3.01 to act as a P2P or GCL receiver.

For the ADAM.NET Utility, version higher than 2.00.06 is recommended.

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**Q:**

Is the new firmware compatible with previous hardware?

**A:**

Yes. New firmware is downloadable and can be installed on older hardware.

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**Q:**

Is documentation available for P2P and GCL?

**A:**

Yes. Detailed descriptions on how to configure P2P and GCL is in the ADAM-6000 Series User Manual. This manual can be downloaded from the B&B website from the ADAM-6000 product page.

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**Q:**

Are there any examples of GCL configurations?

**A:**

There are several GCL application examples described in the ADAM-6000 Series User Manual. When you download the ADAM.NET utility, related GCL example project files will be downloaded at the same time.

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**Q:**

What is the response time for P2P and GCL?

**A:**

**P2P:** For wired modules, the execution time to transfer data from input to output module is less than 1.2 milliseconds. For wireless modules, the execution time to transfer data from input to output module is less than 30 milliseconds (ad hoc mode).

**GCL:** When users choose local output (input and output channel are on the same module), the processing time (including hardware input delay time, one logic rule execution time and hardware output delay time) is less than 1 millisecond. When users choose remote output (input and output channel are on different modules), the total time needed (including processing and communication time) is less than 3 milliseconds.

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**Q:**

How many inputs and outputs can be configured for one logic rule of GCL? How many logic operators can be used?

**A:**

16 GCL logic rules are available on one ADAM-6000 module. For each logic rule, there are 3 input conditions, 3 outputs and 1 logic operator (AND, NAND, OR, NOR). You can combine different logic rules together. (It's called *Logic Cascade*) If you combined 16 GCL logic rules together on one ADAM-6000 module, there will be maximum 16 logic operators, 48 input conditions and 48 outputs available in this single combined logic rule. Logic rules on different ADAM-6000 modules can also be combined together.

**Q:**

Are there any internal counter, timer or auxiliary flags for GCL logic rules?

**A:**

Yes, there are 16 internal counters, 16 internal times and 16 auxiliary flags (similar to internal coils in PLC ladder diagram) on one ADAM-6000 module.