

ADAM-6000 Ethernet I/O Modules

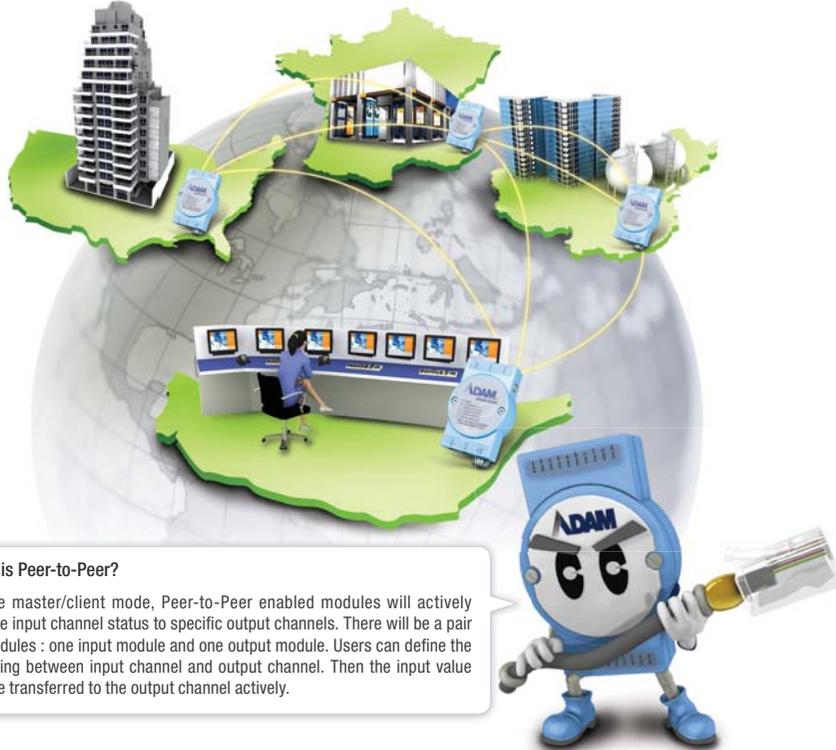
▶▶▶ ADAM-6000 Ethernet I/O Features: Peer-to-Peer *Unlimited Distance!!*

• Requirements

One of our clients has three branches across multiple countries. For each branch, cameras were installed near the gates. At the headquarters, people in the control room can monitor each gate via Intranet. Now they want to enhance the system to remotely control each gate, so that each gate can be controlled from inside the control room of the headquarters. Since the distance between the headquarters and each branch is thousands of miles away, it may be very difficult to establish the extra communication network for this purpose.

• Solution

Through merely 3 pairs of Advantech ADAM-6000 Peer-to-Peer Ethernet I/O modules (without any other hardware), this application has been easily solved. For each pair of ADAM-6000 modules, one module is inside control room of headquarters, and another is located at each branch. When the module in headquarters is activated, it will notify its paired module at the branch to open or close the gate. The communication is Ethernet-based, so that our client can leverage their existing Ethernet infrastructure.



What is Peer-to-Peer?

Unlike master/client mode, Peer-to-Peer enabled modules will actively update input channel status to specific output channels. There will be a pair of modules: one input module and one output module. Users can define the mapping between input channel and output channel. Then the input value will be transferred to the output channel actively.

▶▶▶ What Benefits Do Peer-to-Peer Modules Provide?

• No Controller Required

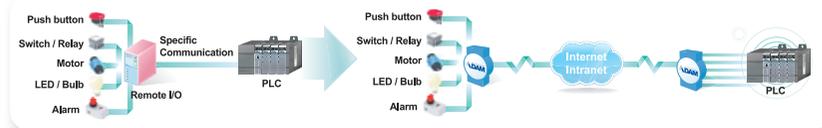
Ethernet I/O modules without Peer-to-Peer functionality have to read data from the input module and then send data to the output module. With Advantech's Peer-to-Peer solutions, the controller can be removed since data will automatically transfer. This not only simplifies the process, but also helps save system hardware costs.

• No Programming Required

To utilize Peer-to-Peer modules, the only thing required is to configure the settings through ADAM.NET Utility (refer to page 33). No additional programming is needed, saving system development time.

• Simple and Flexible System Wiring

Long distance wiring can easily become a nightmare. For some automation applications, if the PLC and the sensors are far away, one remote I/O module needs to be located near the sensors, and a proprietary communication network needs to connect the PLC and the remote I/O module, and the communications distance is severely limited. Moreover, networks provided by PLC manufacturers are rarely open. Peer-to-Peer modules can replace limited and closed networks with no limitations since they leverage open and flexible Ethernet networks.

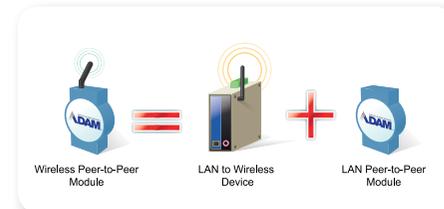


▶▶▶ Why is Advantech's Peer-to-Peer Technology the Best Choice?

• Fast Response Time (< 1.2 ms for wired modules, < 30 ms for wireless modules)

• Simple Wireless Solutions

Advantech provides ADAM-6000W wireless Peer-to-Peer modules (refer to page 15 for more details). Without wireless Peer-to-Peer modules, extra LAN to Wireless devices are needed for Peer-to-Peer functionality. Advantech wireless Peer-to-Peer solutions remove the LAN to Wireless device, that the system cost is saved.



• Advanced Security

When engineers use Peer-to-Peer modules, the output module should not be controlled by non-authorized computers or devices. ADAM-6000 Peer-to-Peer Ethernet I/O modules let users decide which IP or MAC address has control authority. This can make sure the output module is only controlled by its paired input module.

• Advanced Reliability

When communication between pairs of ADAM-6000 Peer-to-Peer modules is broken, the digital output module can generate pre-defined value to ensure safety.

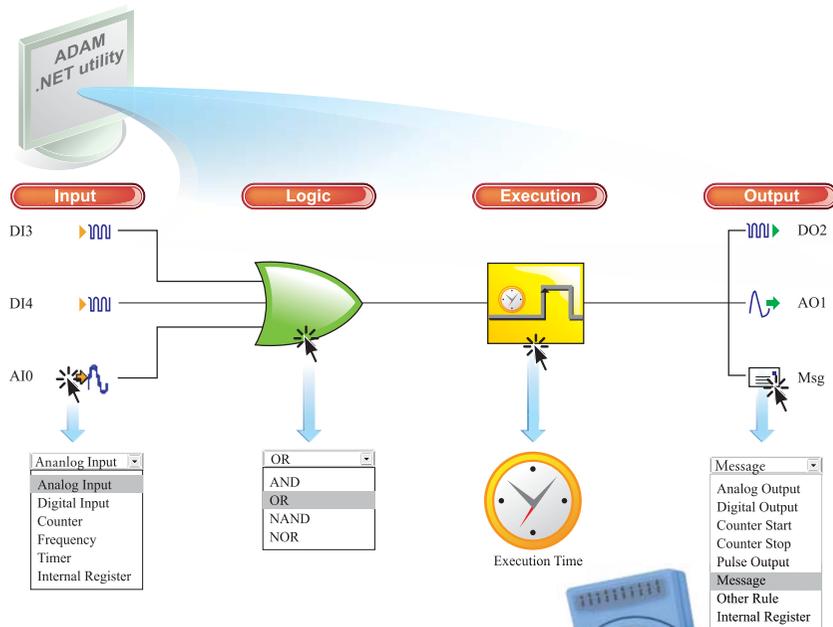
▶▶▶ ADAM-6000 Ethernet I/O Features: GCL *Unlimited Applications!!*

Using Ethernet Modules as Controllers

• What is GCL?

GCL (Graphic Condition Logic) gives Ethernet I/O modules control ability. Users can define the control logic rules through graphical configuration environment in ADAM.NET Utility (refer to page 33 for more detail), and download defined logic rules to specific ADAM-6000 Ethernet I/O module. Then, that Ethernet module will execute the logic rules automatically just like a standalone controller.

For each Ethernet I/O module, 16 logic rules can be defined. In the configuration environment of ADAM.NET Utility, 4 graphic icons shows the 4 stages of one logic rule: Input, Logic, Execution and Output. Users can simply click on each icon and one dialog window will pop-up for user to configure each stage. After completing all configurations, users can click one button to download the defined logic rules to the specific Ethernet I/O module.



In this example: If DI channel 3 is high, or DI channel 4 is high, or value of AI channel 0 is greater than 5 Volt, both DO channel 2 and AO channel 1 will generate signals. At the same time, a message will be sent to the assigned computer.



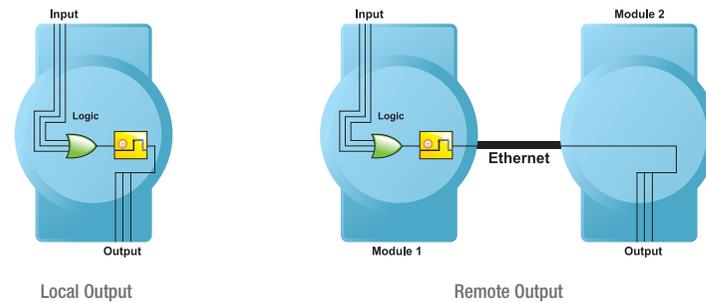
▶▶▶ ADAM-6000 GCL-the simplest Logic Ethernet I/O

• Complete Graphical Configuration Environment

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

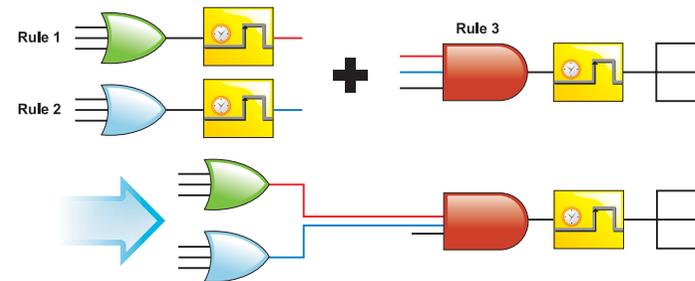
• Supports Local and Remote Output

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



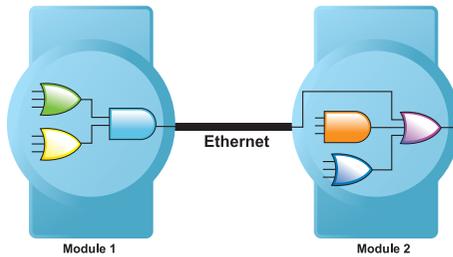
• Cascade Logic

The output of one logic rule can be another rule. Therefore, different rules can be combined together. GCL provides this kind of functionality called Cascade Logic. Once different rules are combined, it helps to create more input numbers. For example, if users combine rule 1 and rule 2 with rule 3, the maximum inputs become 7 inputs. (Two inputs of rule 3 will be rule 1 and rule 2, refer to figure below) So users can define complex logic architecture to satisfy various application requirements.



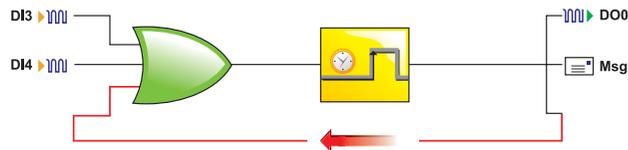
• Distributed Cascade Logic

Users can assign other rule as output of one logic rule. In fact, that "Other Rule" can be on the same module, or on another remote module. So, one GCL logic architecture can operate across different modules. Several Ethernet I/O modules can be integrated into one complete logic system.



• Feedback Function

Users can assign input and output of logic rule to the same internal register, allowing GCL feedback. No hardware wiring is needed. 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

With Advantech complete ADAM-6000 Ethernet I/O modules, GCL delivers variety of input and output options.

Analog Input	Thermocouple, RTD, Voltage, Current
Analog Output	Voltage, Current
Digital Input	Dry Contact, Wet Contact, Counter / Frequency input (up to 4.5 kHz)
Digital Output	Dry Contact, Wet Contact, Relay output, Pulse output (up to 5 kHz)

• Fast Processing Time

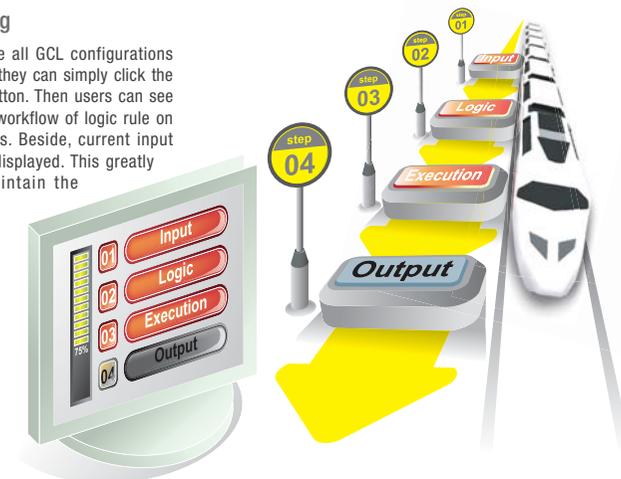
Advantech GCL features extremely short logic rule processing time in market. When users choose local output (the output channel and input channel are on the same module), the processing time (including hardware input delay time, one logic rule execution time and hardware output delay time) is less than 1 millisecond. If users choose remote output (the output channel is on another module), there will be extra communication time, so the total time needed (including processing and communication time) is less than 3 milliseconds.

• Scaling (For Analog Input)

When configuring Analog Input, GCL provides linear scaling function to convert measured voltage/current value to its engineer unit value (such as temperature or pressure unit). Then users can use the engineer unit value to define the logic condition.

• Online Monitoring

After users complete all GCL configurations in ADAM.NET Utility, they can simply click the "Run Monitoring" button. Then users can see real-time execution workflow of logic rule on ADAM-6000 modules. Beside, current input values will also be displayed. This greatly helps users to maintain the system.



▶▶▶ 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, 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

