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Bridging Networks with the Fanuc PLC Family Using HMS Anybus® X-gateway™

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Introduction

Using the existing Ethernet communications port available on the GE Fanuc family of PLC's and the HMS Anybus® X-gateway™, it is possible to create a transparent bridge between the PLC and any commonly used industrial network via Modbus/TCP.

The Anybus® X-gateway™ family is a product line aimed to connect almost every possible combination of two industrial networks. The product family supports 17 different fieldbus networks such as PROFIBUS, DeviceNet, CANopen and CC-Link allowing the GE Fanuc PLC family easy data transfer via Modbus/TCP. The X-gateways™ are designed for use in industrial automation plants where increasingly many different networks are used. The X-gateways™ help system integrators to easily inter-connect any GE Fanuc PLC, enabling consistent information flow throughout the entire plant.

The X-gateways™ primarily focus on the transfer of cyclic I/O data between two networks. This can either be a slave-slave combination or a master-slave combination. During the setup of the gateway, the user simply selects the amount of I/O to be transferred between the GE Fanuc PLC and the “foreign” network. Since all industrial networks support a different amount of I/O data, the network with the least amount of I/O data determines how much data can be transferred in each case. The transfer time between the 2 networks is typically 10-15ms.

The X-gateways™ can bring together the network worlds of GE-Fanuc, Siemens, Rockwell, Schneider, Mitsubishi, Omron, Hitachi, Bosch, Moeller, B&R, Beckhoff and many more.

Problem Statement

All PLC system designers and programmers, at one time or another need to communicate with equipment or devices operating on a network other than the one to which our GE Fanuc PLC is attached. Creating a bridge between the two networks in order for the GE Fanuc PLC to send and receive data is usually problematic and time consuming to accomplish. Sytech System's client needed to interface between a PACSystems RX7i PLC and a Siemens Simocode Motor Management system operating on a PROFIBUS network.

Previous Options

If there is an open slot in the GE Fanuc PLC rack *and* there is a GE Fanuc card or third-party VME card available to make the connection, then creating a bridge between the PLC and the "foreign" network is not too difficult. However, if there is no slot available, then the expense of expanding the current rack or adding another rack can be a costly proposition. Furthermore, some third-party VME cards have a set of issues all of their own, making their inclusion into your application time-consuming. In the case of Sytech System's client, the caveat was there could be no rack expansion or PROFIBUS communication cards added to the system.

The Sytech Systems Solution

Using the Anybus® X-gateway™, Sytech Systems can provide a bridge

between the Fanuc PLC Family's intrinsic or existing Ethernet network and almost any other industrial network. As in our client's application, PAC System RX7i Ethernet-to-PROFIBUS network slave devices, Sytech Systems can create a communications path to meet the required specifications

Benefit 1

Implementation of the Anybus® X-gateway™ does not require the use of Fanuc or third-party VME communications cards. There is never a need to expand the current PLC rack size or add an expansion rack.

Benefit 2

The remotely mounted and independently powered Anybus® X-gateway™ uses existing Ethernet communications to exchange data with the Fanuc PLC via Modbus/TCP. No other equipment is required to bridge between the PLC and another network other than the Anybus® X-gateway™ and a 24vDC power source.

Benefit 3

In the PACSystems RX7i-to-PROFIBUS application discussed above, the Anybus® X-gateway™ allows up to 125 PROFIBUS slave devices. As cited in the example, the PACSystems RX7i has up to 32 Modbus/TCP channels. If each Modbus/TCP channel were connected to an Anybus® X-gateway™ device, the PACSystems RX7i could potentially communicate with 4000 PROFIBUS slave devices. Furthermore, communications between the PACSystems RX7i and the PROFIBUS network do not add significantly to the PLC sweep time. The PLC is able to both read and write data to and from the PROFIBUS slave devices.

Implementation

Using our client's application as an example, the Anybus® X-gateway™ must first be configured with an IP address as an Ethernet slave. Then it is configured as a Modbus server. Next, the Anybus® X-gateway™ must be configured with an image of the PROFIBUS network it serves. After configuration, the device is installed as the "bridge" between the two networks and communications confirmed between the Ethernet Slave and PROFIBUS Master sides of the device. Finally, programming is added to the PLC application to read, write, and implement data from the "foreign" network. COMREQ function block, command block, and Modbus/TCP channel commands direct the communications between the Fanuc PLC and the Anybus® X-gateway™ as well as provide Status Data to monitor the health of the interface.

Summary

By using the Anybus® X-gateway™, Sytech Systems can bridge the Fanuc PLC Family to almost any other industrial network without adding more cards or racks to the system. The Anybus® X-gateway™ is economical, robust, and proven technology. The "foreign" bus data is easily read and written to by the Fanuc PLC. The flow of information is transparent to the Fanuc PLC application. The status of both the Anybus® X-gateway™ and the "foreign" bus may be monitored.

In applications requiring a simple information transfer between two different industrial networks, the Sytech Systems Anybus® X-gateway™ solution is an option worthy of consideration.

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