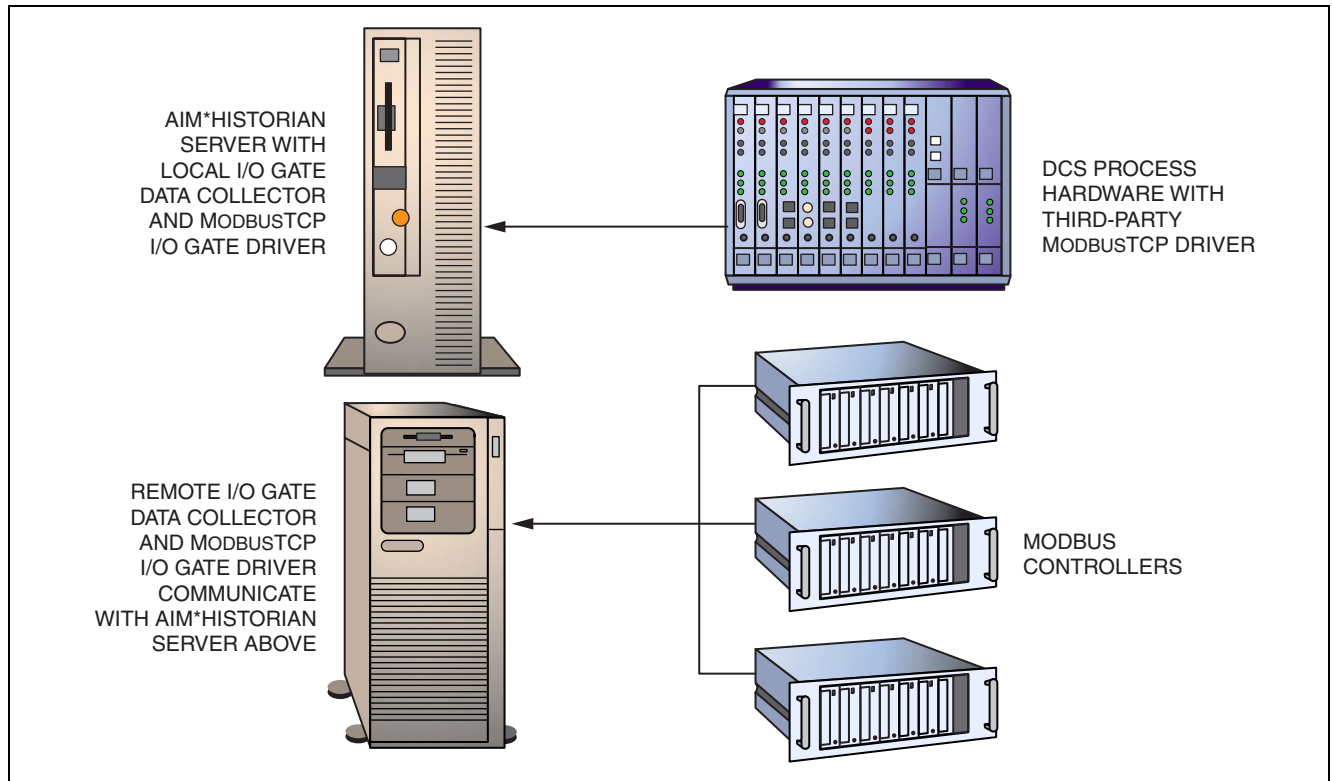


I/A Series® Information Suite

AIM*AT I/O Gate for MODBUSTCP



*The AIM*AT MODBUSTCP I/O gate acts as a bridge between the I/O gate data collector and your control process, using a TCP/IP Ethernet connection to the control system. It is one of a series of I/O gate drivers provided as part of the AIM*AT software.*

OVERVIEW

The efficiency of today's plant floor is increasing in direct proportion to the availability of more automated devices and systems. To tap this potential, the process engineer is faced with the need to integrate these modern hardware devices, as well as older, existing devices, with an automated software system to maximize process efficiency and to make plant floor information available on an enterprise-wide basis.

The AIM*AT software utilizes an I/O gate architecture along with an integrated device driver capability. Each I/O gate provides a connection capability between the AIM*Historian software and plant/mill process devices using specific connection mechanisms, such as MODBUSTCP. If a driver available from any vendor supports the connection mechanisms within an available I/O gate, the device can be connected to the AIM*Historian software.

I/O GATE ARCHITECTURE

The AIM*AT I/O gates provide connectivity between AIM*Historian software and a wide range of distributed control systems (DCSs), programmable logic controllers (PLCs), and other control systems. The I/O gate is configured within the AIM*Historian software instance to receive data from specific protocol drivers. The MODBUS TCP I/O gate uses remote procedure calls as the connection mechanism between AIM*Historian software and the I/O gate.

Each I/O gate driver is optimized for plant floor integration and uses a COM-like internal design. It integrates with the AIM*Historian software allowing a user to control the connection to each device independently. Previously made connections are automatically reconnected on reboot.

An I/O gate can be local or remote from the AIM*Historian software instances it supports. To make a single connection, you need an I/O gate collector and an I/O gate driver operating on the same computer. If a network is used, more than one connection can be made using a single network connection. If dedicated connections are used, each requires a separate driver, but a single I/O gate collector can be used for all drivers using the same connection mechanism, such as MODBUS TCP. The MODBUS TCP I/O gate driver and I/O gate collector can be installed separately on a Windows NT platform to provide data collection from MODBUS TCP compliant devices (Figure 1).

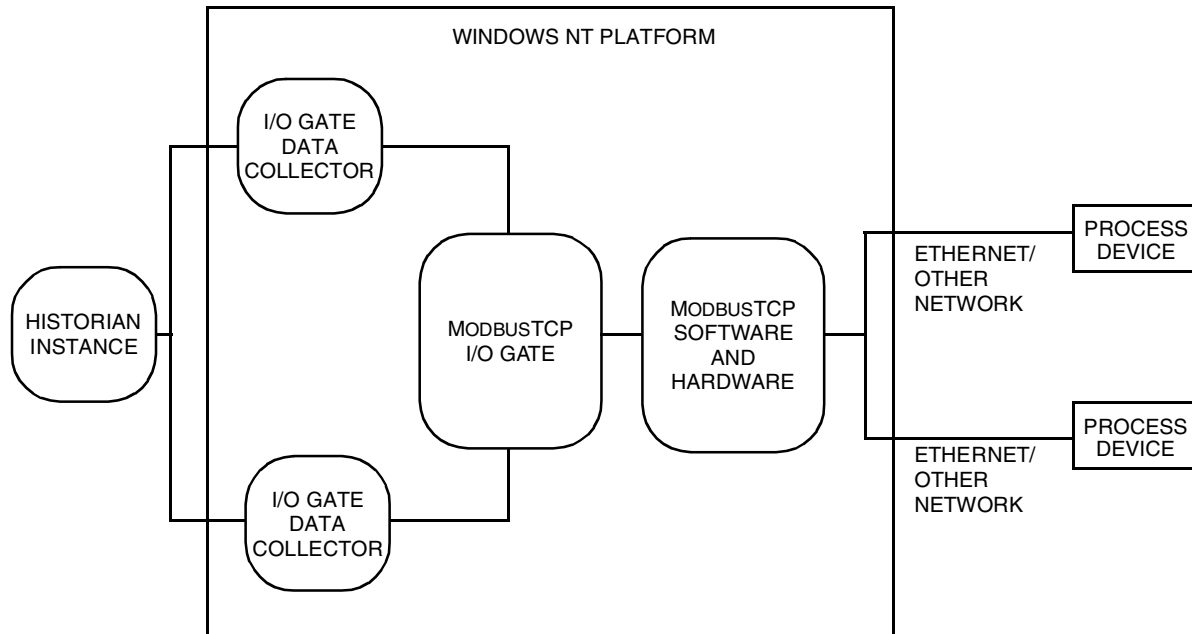


Figure 1. Open Device Integration Architecture Showing a MODBUS TCP I/O Gate with Other I/O Gates

EXPANSION CAPABILITIES

The practical limitations in a system are determined by the host hardware being used and the implementations of the applications connected through the MODBUSTCP I/O gate. This means that as more powerful workstations and faster media become available, an application can be upgraded to take advantage of the increased capability without running into logical limitations or changing the database for the existing connections.

The practical limitations in an application are determined by:

- The processing power and memory available on the PC where the I/O gate is installed.
- The specified limitations of the device protocol. For example, if a specific protocol is the limiting factor in your data throughput, upgrading the driver to a higher performance driver with the MODBUSTCP I/O gate enhances the system throughput without changing the MODBUSTCP I/O gate.
- The memory size, processing speed, and other restrictions of the connected device. For example, a given programmable logic controller may only handle 100 points and may only be able to process 25 points per second.

WIDE VARIETY OF DRIVERS

The MODBUSTCP mechanism is supported by any available connection mechanism, from vendors of plant floor devices and their drivers. Any driver implemented as a MODBUSTCP server that presents data in a form compatible with the AIM*Historian software can connect those points using the MODBUSTCP I/O gate. The compatible formats are:

- Float
- Boolean
- String
- Integer
- Short
- Long.

The MODBUSTCP I/O gate supports direct connections to devices on subnetworks from a main network when the MODBUSTCP server supports these features. Since installation and setup of the server is generally unique to each vendor, the vendor must supply a means of setting up and configuring the driver.

SIMPLIFIED CONNECTION CONFIGURATION

Once a MODBUSTCP server is set up, a short series of dialog boxes walks you through the task of configuring the connections for each device and each point on the device. Real-time points (RTPs) are configured, within the AIM*Historian software instance, to include the unique I/O gate driver (Figure 2) and item names.

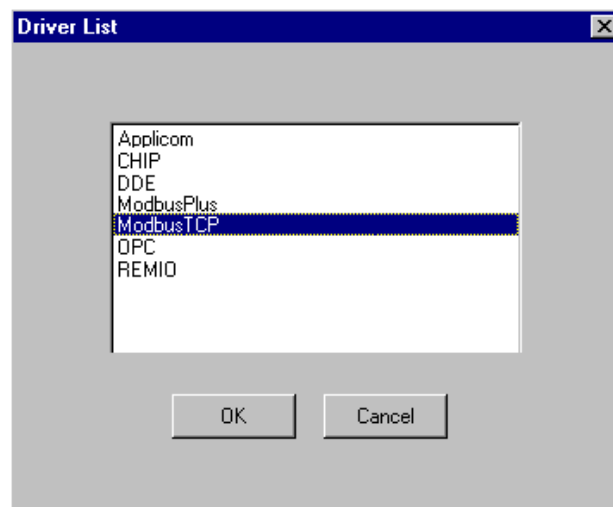


Figure 2. Driver List Dialog Box

Configuration is quick and easy since you are not required to provide any protocol-specific information, but simply a list of data points to be connected. You do not need to become an I/O expert or know each protocol inside out to configure interfaces.

Once a connection is configured, the MODBUSTCP I/O gate collector uses the port name, device name, and item name to form a path that identifies a given data point. The AIM*Historian Configurator constructs the item name from information you enter in the MODBUSTCP dialog box (Figure 3).

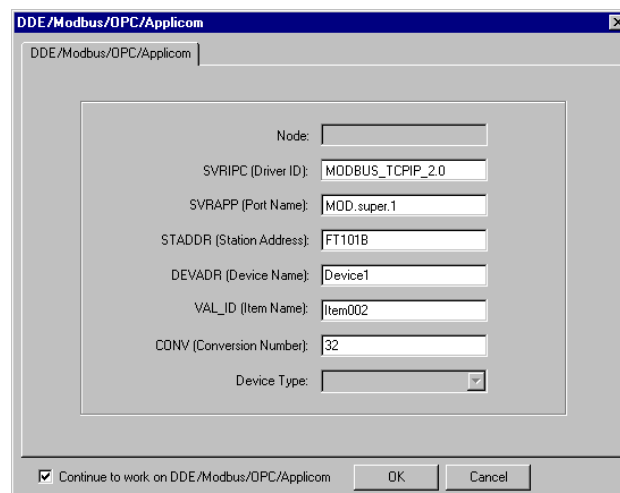


Figure 3. MODBUSTCP Dialog Box

All configured information is retained, so if your PC loses power and is then restored, or is rebooted for any reason, the connection is automatically restored.

CONSISTENT INSTALLATION

The I/O gate driver setup program provides a consistent installation sequence for the different I/O gate drivers. Although MODBUSTCP grouping names, such as Application and Topic, are replaced by other names when using different connection mechanisms, connection concepts are represented consistently. The I/O gate collector is installed as part of AIM*Historian software setup.

DATA INTEGRITY AND SECURITY

The I/O gate employs a store-and-forward mechanism that collects real-time data into a configurable circular file. In the event of a loss of communications to remote AIM*Historian software, the I/O gate continues to collect data into a local file. When communication is restored, all collected RTP values are transmitted to the AIM*Historian software with no loss of information.

CONSIDERATIONS

Available PCI and ISA Card Slots

The physical limitations that you need to consider relate to the interface card. Most drivers require that you use a particular interface card, such as an Ethernet card. You need to consider all the interfaces being made on the I/O gate processor and which of the available PCI or ISA slots each is using. Availability of card slots often limits the number of interfaces a processor can support. If the driver requires a specific interface card, it must be able to use one of the available interrupts after all other cards have been assigned their interrupts.

Driver Limitations

When you select a driver, you need to determine how many machines can be connected to its interface bus or network.

The limitations can be physical, such as the loading limits on an RS-485 bus or they can be logical, such as the number of available addresses in a network.

There could also be traffic limitations for the bus or for the driver itself. The vendor supplying the driver is the best source of information on the limitations for the driver and the network or bus with which it is interfacing.

Platform Processing Power

The processing power of the platform can be the determining factor for the number of MODBUSTCP points that can be connected. As faster processors with deeper cache continually become available, more data points can be processed.

Processor loading in the Functional Specifications section is for a 300 MHz processor. Processor loading of all applications running on the platform need to be considered in determining how many machines a given processor can integrate.

FUNCTIONAL SPECIFICATIONS

Supported Platform

- Pentium PC
- Microsoft Windows NT 4.0 server or workstation with Service Pack 4
- 300 MHz, 128 MB RAM
- 4 GB hard drive
- CD-ROM drive

Supported Physical Connections

Generally unrestricted, including Serial, Ethernet, and ARCnet

Installation

One MODBUSTCP I/O gate driver per processor

Data Types

Float, Boolean, String, Integer, Short, and Long

Number of Servers (Applications Supported)

Platform dependent based on available card slots and processing power

Number of Topics Supported

Platform/server dependent

Number of Items Supported

Platform/application dependent

Maximum Update Rates

Data scan update every half-second

Processing Load for MODBUSTCP I/O Gate

The MODBUSTCP I/O gate uses less than 5% of the available CPU power of a 300 MHz processor to connect up to 100 connections, assuming every point changed at least once per second. If values change on the average of once per minute, the connections load the processor by less than 5% several times.

Shipped Components

- Components that are shipped include:
 - CD-ROM containing both the I/O gate software and a setup program.
 - The AIM*AT I/O Gate Drivers User's Guide (B0193YU) describing how to install, operate, and maintain AIM*AT software I/O gate. A support contract for your application can be purchased from The Foxboro Company.
- At your request, The Foxboro Company provides:
 - A list of drivers which have been tested by The Foxboro Company. They are available for purchase through The Foxboro Company.
 - A list of known MODBUSTCP drivers from third-party vendors. These drivers have not been tested and are not warranted by The Foxboro Company. They should be supported by the vendor listed.

The Foxboro Company

33 Commercial Street
Foxboro, Massachusetts 02035-2099
United States of America
<http://www.foxboro.com>

Inside U.S.: 1-508-543-8750 or 1-888-FOXBORO (1-888-369-2676)
Outside U.S.: Contact your local Foxboro representative.

Foxboro, AIM*AT, AIM*Historian, and I/A Series are trademarks of The Foxboro Company.
Invensys is a trademark of Invensys plc.
Modbus is a trademark of AEG Schneider Automation, Inc.
Pentium is a trademark of Intel Corporation.
Windows NT is a trademark of Microsoft Corporation.

Copyright 2000 The Foxboro Company
All rights reserved