CTH Systems Inc

Motorola eNews

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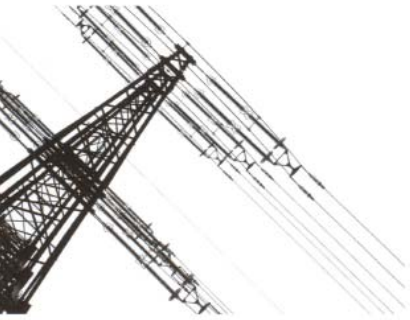

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Quick Information Lookup

- ACE Training
- Motorola Block Valve Control - CTH Solution Story
- Motorola IP Gateway
- How can SCADA Systems Optimally Operate Over GPRS Networks?

ACE Training - Calgary

When: March 25 - 28, 2008
Time: 8:30am - 5:00pm
What: Motorola ACE Training Session
Cost: $2900.00 + GST per person
Where: CTH Systems, Calgary
#130, 6807 Railway Street SE

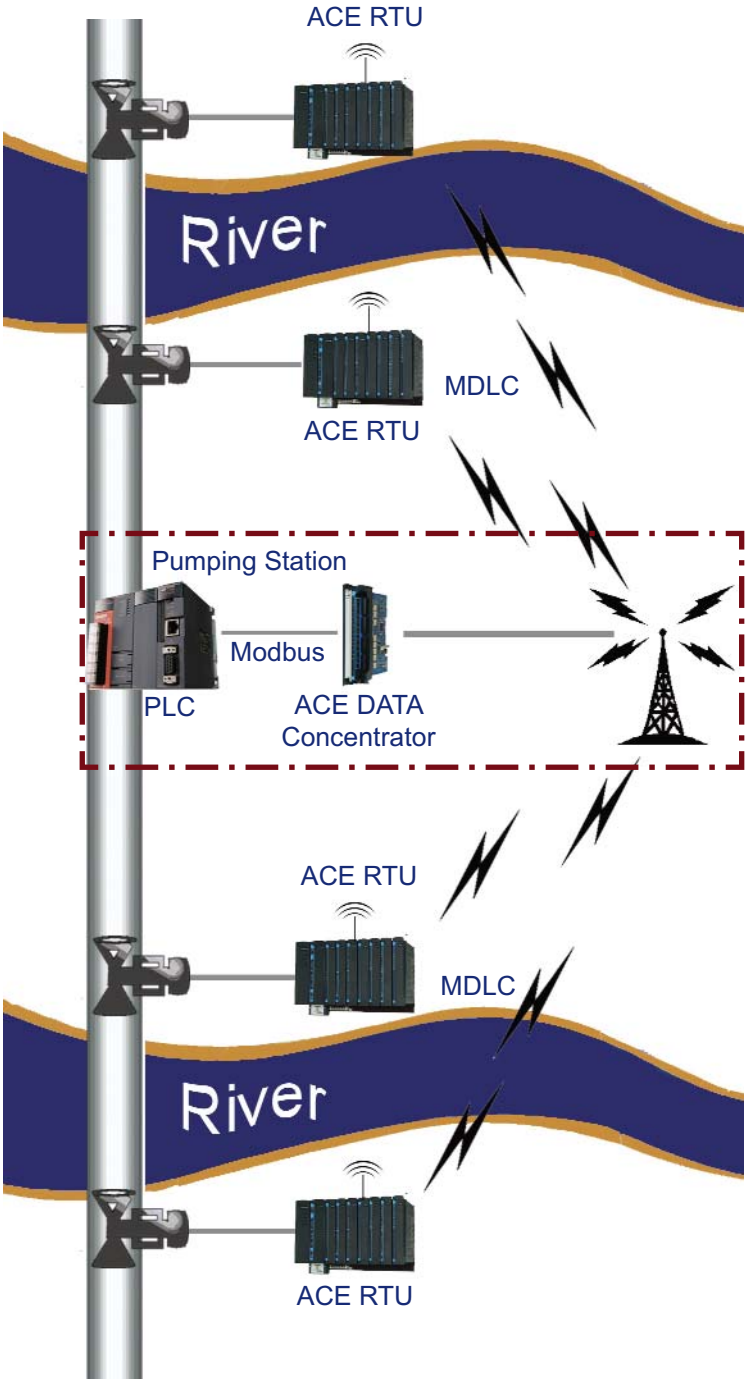
ACE Training - Vancouver

When: April 1-4, 2008
Time: 8:30am - 5:00pm
What: Motorola ACE Training Session
Cost: $2900.00 + GST per person
Where: Executive Inn, Burnaby
4201 Lougheed Hwy

Course Outline & Registration

CTH Solution Story

Motorola Block Valve Control



Challenge

When operating a pipeline spanning great distances over vast and varied terrain, there are many environmental and technical challenges.

One challenge CTH Systems has been involved in solving is remote communications that are secure and reliable over the entire pipeline for block valve control at river crossings. The environmental regulations addressing the potential of a leak into the water are many. The financial impact of a failure can be huge in addition to the public perception.

Benefits

- **CTH Systems has found the RF solution fits well because you own the infrastructure and are not dependent on a public network.**
- **The initial costs are low because it's a bite size approach to sectioning the pipeline.**
- **You own the RF network which means when you expand the pipeline you can use your existing RF system.**
- **The robust protocol saves you on-site travel costs plus protects you with encryption.**

Solution

- **Motorola ACE RTUs**

The first step is to divide the pipeline into small sections that make up the whole pipeline. We analyze where the pump stations are located and where the pipeline crosses any body of water. Once this has been broken down we can look at how to communicate from the pump station to the block valve sites. In most cases the pump station will have to communicate with multiple water crossings.

The approach is then to use a Radio Frequency (RF) approach; relaying the data through a set of RF frequencies on a per station basis. A radio path study is performed at each station to determine the best communication network such as Analog VHF/UHF radio, digital or analog trunking radio, wide band spread spectrum data network, GSM/GPRS, iDEN/Nextel or CDMA.

The Motorola ACE RTU comes into play with its robust over the air protocol that is optimized for remote communications.This protocol handles all the errors, retries, rerouting and remote application downloads/uploads online without complicated setup or programming. The seven layer MDLC protocol takes care of this for you, a true multi-session protocol for RF. The other advantage to the protocol is that it has built-in encryption at no additional cost, which keeps your application safe and secure.

We install an ACE3600 RTU at each block valve site and an ACE Data Concentrator at the pump station that communicates with a PLC. (See Drawing)

Back to Top

More information

IP Gateway

The IP Gateway is the bridge element between a ACE3600 radio-based Wide Area Network (WAN) and the computer system's Local Area Network (LAN).

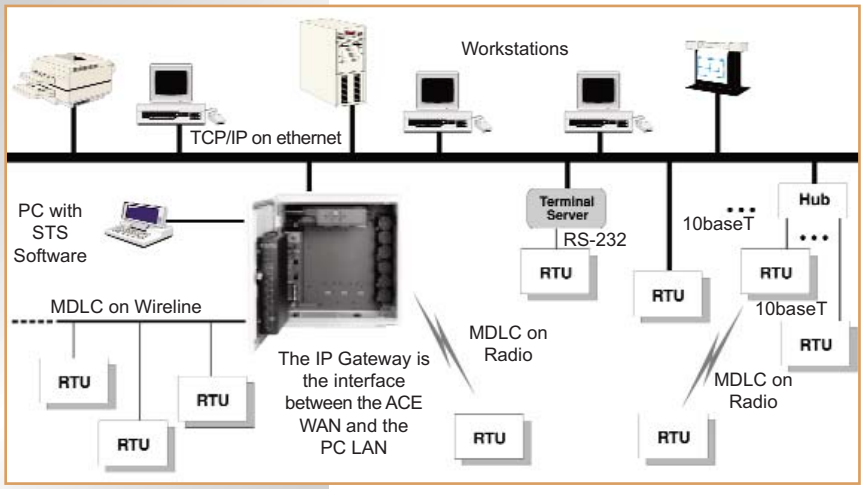
Features / Benefits

TCP/IP

Ethernet and TCP/IP is the communication medium and protocol commonly used in a computer Local Area Network (LAN). The LAN provides connectivity among multiple users performing simultaneously the many different tasks required by large computer-system users. The IP Gateway provides an Ethernet and TCP/IP connection into the LAN for data from ACE3600 field RTUs.

- The core computer system, with all features intact, may directly utilize field data in their SCADA applications, customer service, dispatch, Network Fault Monitoring and other operational activities.

IP Gateway in SCADA System



MDLC and SNMP Protocol

MDLC is the seven layer protocol used by ACE3600 that conforms to the ISO recommendation for Open System Interconnection (OSI). It is designed for on-radio use and allows multiple logical communication channels per communication medium thereby making possible simultaneous Host-to-RTU, RTU-to-Host, and RTU-to-RTU data sessions. SNMP is the protocol often used in Network Fault Management systems.

- A designed-for-radio protocol optimizes the data transfer between field RTUs, including communications with a central computer system. Maximum data throughput with minimum communication channel occupancy is provided.
- The availability of both protocols within the IP Gateway helps insure that connectivity to the system's host computer will be available.

Connectivity

One or two ports on the IP Gateway may be used for communications with ACE3600 field RTUs via different physical media and utilizing different data speeds. Connection into an ethernet may occur via the AUI or 10baseT port. The STS programming software, running on a PC computer, may also be connected to the IP Gateway for over-the-air programming or diagnostics of the field RTUs.

- These connectivity capabilities permit the creation of communication topographies appropriate to the needs of the system.

Configuration & Simulation

Each IP Gateway includes Windows-based configuration software. This software eases the setting of communication parameters in the IP Gateway. Sample programs are included in C-language to assist the integrator develop the proper interface between TCP/IP and the target SCADA, dispatch, billing, and other applications.

- Building the custom software interface to the IP Gateway is made quite easy via the available examples plus the development and configuration tools.

Back to Top

Advanced SCADA Solutions for Gas Pipeline Systems

Authors: Danny Parvary, Dan Ehrenreich, Motorola

Abstract

Supervisory Control and Data Acquisition solutions (SCADA) provide improved monitoring and management of remote installations, a means for reducing the cost of maintenance as well as safer control of the entire infrastructure. While implementing their system solutions, the application program must be tailored to the specific customer needs as defined by the system architects. Furthermore, reliable SCADA solutions must be based on reliable operating Remote terminal Units (RTUs) as well as reliable and secure communications.

Petroleum pipeline transport companies require the control and monitoring of the natural gas transmission pipelines. The typical SCADA system comprises of a Master Control Center (MCC) software package, which in most cases include few Secondary or redundant Control Center (SCC) and operator consoles. The communications media between MCC (and SCC) to Valve and Pressure Reduction and Metering Stations (RMS) are comprised of GPRS modem, Conventional radio, leased lines modem, LAN, microwave, and fiber optic links.

System Functionality

Valve Station - The typical and most important role of the Valve Station is to sectionalize the pipeline to ensure that in the case of a leakage or pipeline damage the entire pipeline network will not have to be shut down.

RMS - The role of the RMS is to regulate the transporting conditions at the customer side, such as pressure and temperature, and also to measure the consumed flow. RMS units are located at the beginning of the regional gas distribution networks or placed for benefit of high capacity customers like industrial plants. The reduced pressure value may vary for different industrial plants but typically it is 15 Bar for regional distribution firms. The output temperature from the pipeline to regional distribution firms is typically 15°C.

The basic process in the RMS stations involves filtering, preheating, pressure reduction, and metering of the flow. The entire process is supported by various measurements and calculations based on temperature, pressure, differential pressure, dirt/waste separation and Flow metering. The RTU functions at the remote site are related primarily to the communications of monitored data and the execution of commands from the MCC. The role of the MCC is to monitor the system operation in real-time as well as calculate predictive and transient models, which estimate the amount of gas to be consumed by the customers. The role of the RTU is to perform AGA-3, AGA-7 and AGA-8 calculation programs for gas flow measurement.

Structure of ACE3600 Remote Stations

The valve station's role is to sectionalize the pipeline whenever a problem occurs or a maintenance procedure is to be executed. It is comprised of an electrically operated valve and a manually operated bypass valve, as seen on Figure 1 below. The RMS stations are made of multiple valves, filters, preheating, pressure reduction, and flow metering equipment. The process is supported by measurements and calculations based on temperature, pressure, differential pressure, and flow metering. Some valves are manually controlled while some are controlled by the ACE3600 RTU as seen on Figure 2 below.

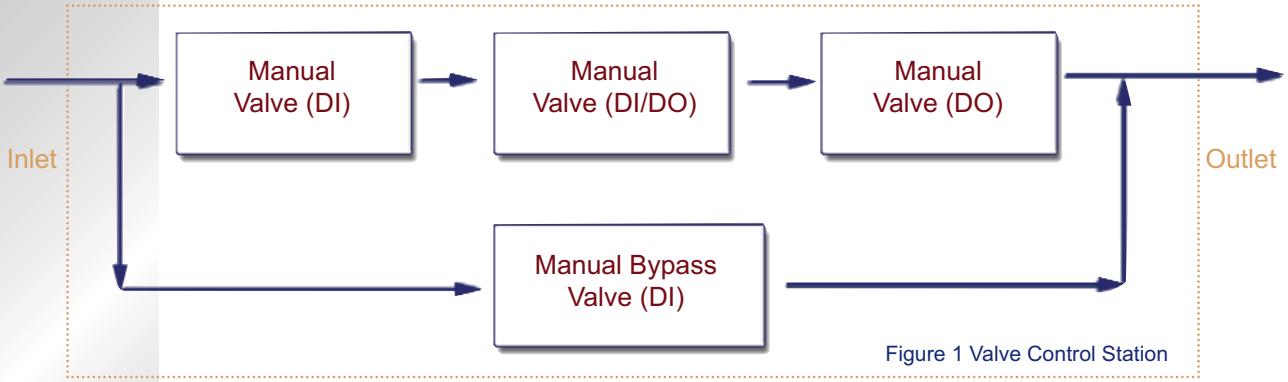


Figure 1 Valve Control Station

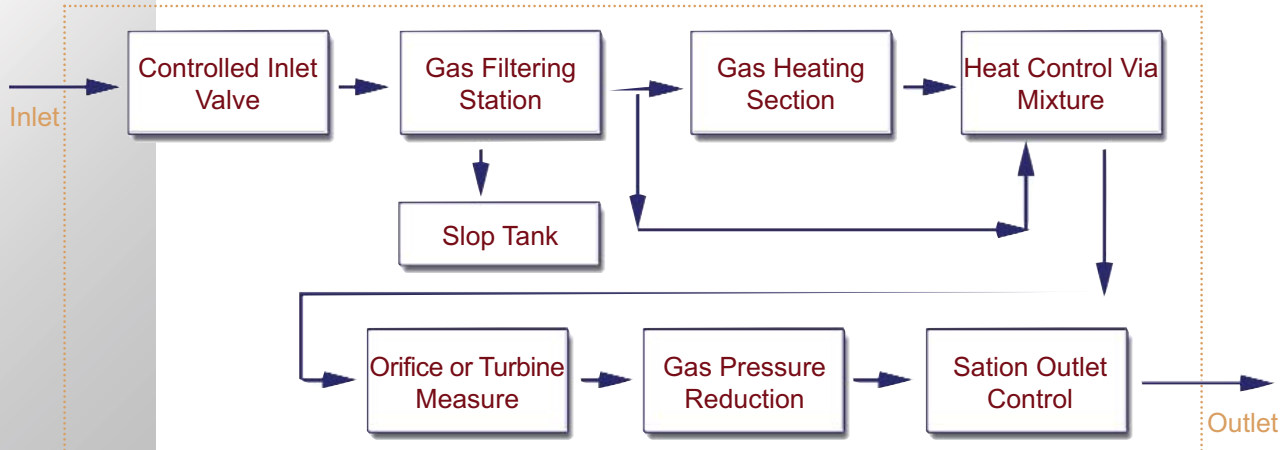


Figure 2 Typical Single Path RMS Station

Structure of the Control Center

The system will have a prime control center and two secondary control systems. The final system (which will handle 750 sites) will implement 8 secondary master stations. Each computer will have dual LAN and Terminal Servers (TS) connecting to Microwave links via a standard 4 wire connection. The main control center has four UNIX machines: 2 for CMX or real-time processing and 2 for XIS or historical data processing. It also has 6 XOS or operator consoles. Each of the secondary sites is equipped with only a single UNIX machine that performs both real-time and historical tasks. Each secondary site also has a single XOS operator console. Communications between these two centers will be done over leased lines with a dial back-up. All new Motorola RTUs (added as part of the project) will report to both control centers over a dual redundant microwave system, at the rate of 9600 bps. Connection to microwave will be via 4-wire lines. The following software programs run at the computers:

- EFM – Electronic Flow Monitoring
- GQM – Gas Quality Monitoring
- GCM - Gas Contract Monitoring (for control of customers consumption)
- Gas Pipeline Simulator – Using the Stoner model Helps to allocate the right amount of gas as per the predicted / pre-programmed demand
- Flow Data Validation – The computer will re-calculate the flow based on the raw data reported via the RTUs. This will test the accuracy of the flow meters (such as Daniel).

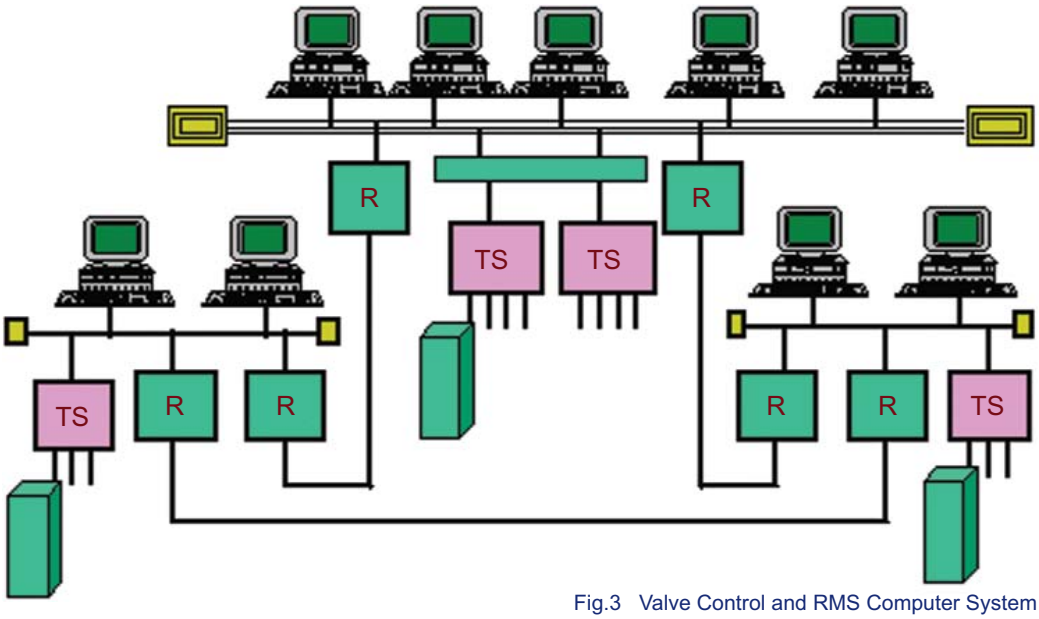


Fig.3 Valve Control and RMS Computer System

Data Communications

SCADA provides improved monitoring and management of remote installations as well as a means for reducing the cost of maintenance and safer control of the entire infrastructure. While implementing data communication solutions for connecting RTUs with MCC, oil companies and utilities must pay special attention to issues which are unique for wireless communications.

- Networked communication: Modern Integrated SCADA systems shall allow a seamless net worked data communication from any RTU to RTU and from any RTU to the MCC computer using multiple media and involving multiple protocols used in some parts of the system. SCADA engineers must have this level of communication flexibility to assure that all telemetry functions will properly operate.
- Data Reliability: Presentation of field parameters and status changes on the SCADA screen must be absolutely reliable , accurate, and reflect the true infrastructure conditions . Furthermore , commands sent from the SCADA control center to a remote site (RTU) must be reliable and promptly executed . Upon completion of the task, information shall be sent to the control center .
- Data Security: Today, more than ever before, SCADA operators are conscious about secure operation of their system. In SCADA applications this is interpreted as an urgent need for a secure network that cannot be listened to or analyzed from outside the network or receive non-genuine commands. Several encryption and authentication principles are available today and used in SCADA systems.

These, and many more data communications related benefits, can be achieved by use of ISO/OSI based seven layers data protocol. The use of this communication process allows SCADA systems to be upgraded and expanded with far less boundaries. Use of the MDLC protocol in a wide area SCADA system, as described in this paper, results in simplified programming, less costly system upgrades, retrofits and expansions, and improved maintenance procedures and it more than justifies the investment.

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