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Yokogawa FAST/TOOLS SCADA System Centralizes Monitoring & Control of India's Gas Pipelines

GAIL Limited

Location: Multiple locations, India
Order date: April 2011
Completion: July 2012
Industry: Oil & Gas

Executive Summary

GAIL (India) Limited (GAIL) is India's flagship natural gas company, integrating all parts of the natural gas value chain including exploration & production, processing, transmission, distribution, marketing, and services. GAIL has built two major liquefied petroleum gas (LPG) distribution networks centering on the Jamnagar Loni LPG pipeline and the Vizag Secundrabad LPG pipeline, which transport gas to bottling plants. GAIL also presently has seven natural gas pipeline networks across the country, with a total length of over 10,700 km. Until recently, each of GAIL's pipeline networks was controlled by its own independent supervisory control and data acquisition (SCADA) system.

Considering the difficulty in managing many different SCADA systems, GAIL decided to implement a single centralized SCADA system for all of its natural gas and LPG pipeline networks, and to integrate this system with all pipelines that are either currently under construction or on the drawing table. Yokogawa was entrusted with the conceptualization and implementation of this state-of-the-art, centralized SCADA system, relying on the FAST/TOOLS SCADA software package and a system architecture that was best suited to GAIL's pipeline networks and its expansion requirements. Yokogawa also signed a long-term contract with GAIL based on which it will endeavor for a 10-year period to integrate all upcoming pipelines with this system in a cost effective and timely manner.

Work by Yokogawa on the replacement of the existing systems with a single SCADA system and the integration of multiple makes of remote terminal units (RTU) was completed in just 15 months. The new SCADA system was installed at the National Gas Management Center (NGMC) in Noida, in a main master station (MMS) that houses all the main SCADA servers. The system was also installed at a hot backup master station (BMS) in Jaipur.

Today all pipeline networks can be monitored and controlled centrally from the NGMC using the reliable FAST/TOOLS data communication package. The FAST/TOOLS system at the MMS has also been integrated with a gas management system (GMS) so that all operation data can be directly utilized for gas allocation and billing. Email and short message service (SMS) notification of critical alarms is supported, and authorized persons have access to this SCADA system anywhere an Internet connection is available.


National Gas Management Center

The Challenges and the Solutions

Achieving efficient operation with higher system availability

Previously, GAIL personnel used telephones to manually collect the operation data for each of the regional pipelines. To improve overall operation and management of the gas pipelines, GAIL decided to put in place a single centralized control room and, as a disaster preparedness measure, have the backup and main master stations in separate locations.

For the central control room, Yokogawa provided the FAST/TOOLS package and a high availability computing (HAC) solution that utilizes a history server, client server, and zonal server in a triple redundant configuration. From their terminals in the central control room, operators can view the operational data for all the regional pipelines, and access to this data is assured 24/7 throughout the year. For each regional gas management center (RGMC), Yokogawa also implemented a FAST/TOOLS- based HAC solution that relies on dual redundant front-end processor (FEP) servers, for uninterrupted monitoring and control.

Thanks to this redundant configuration, the flow of operation and maintenance (O&M) data from the field is ensured. As a result, operators, production engineers, and analysts at the NGMC have the real-time visual access at all times to the data needed to efficiently operate this nationwide pipeline network. System availability for the entire GAIL pipeline network has been increased to 99.5%, ensuring a steady supply of gas across the nation.

Overview of system architecture
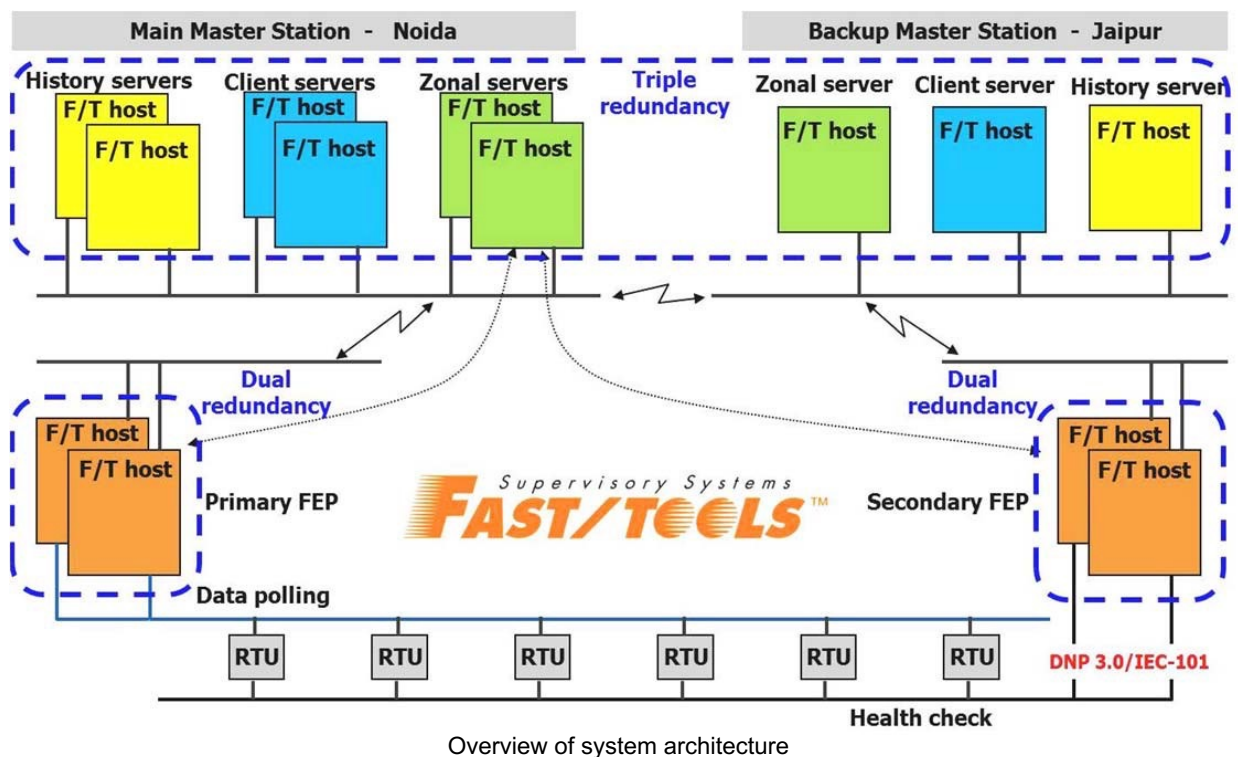
Note:

F/T: FAST/TOOLS
RTU: Remote terminal unit FEP: Front-end processor
Zonal server: Selects which FEP will poll data from RTUs
DNP 3.0 / IEC-101: Remote communication protocol

Customer Satisfaction

S. K. Agrawal, a Deputy General Manager for GAIL, commented, "This is the largest ever SCADA system commissioned by GAIL. Yokogawa has really done a commendable job by completing this centralized SCADA system within the contracted completion period of 15 months. This work included the integration of approximately 400 RTUs of eight different makes. They demonstrated excellent global teamwork in dealing with several real challenges and providing solutions for the new modular system architecture. In addition to improving O&M, the centralized SCADA has substantially reduced CAPEX and OPEX. All new pipelines coming up in the next 10 years will be integrated with the centralized SCADA system in a cost effective and timely manner."

S. K. Agrawal Deputy General Manager

Summary of Customer Benefits

1. Steady gas supply
   - Uninterrupted monitoring and control thanks to an architecture that significantly improves system availability

2. Improved operation & maintenance
   - Visualization of all pipeline operation data
   - Total system integration with a single interface

3. Minimized TCO
   - High system availability thanks to double and triple redundancy
   - Centralized system support for engineering, operation, and maintenance
   - More efficient training for a single SCADA system

Yokogawa Electric Corporation

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