ABB centralizes Gas and Condensate Operations in Kuwait

"A huge Telemetry Network concentrates Data Handling and Production Optimization at Gas Management Center in Burgan"

PROJECT SCOPE SUMMARY

The Telemetry for Gas and Condensate Networks Project provided KOC by an automated extended management system to effectively monitor and control the gas and condensate networks by products-wise tracking.

KOC's surface production facilities spread across three main assets (South East KW, West KW & North KW). Numerous gathering centers, booster stations, water handling/disposal plants form an impressive network of crude, gas and condensate pipelines of various sizes and pressures.

The gas & condensate networks comprise approximately 2,000 Km of pipelines ranging in size from 3" to 52" and approximately 80 manifolds for the inter-field/intra-field transfer of hydrocarbon fluids and dispatch to KNPC.

"Telemetry for Gas and Condensate Networks Project" complements the KOC purpose of revamping and up-grading to target a consistent increase of production pursuing important optimizations like, for example, a very stringent gas flaring.
Ambition here is to knock down from 5.2% flared gas percentage of 2006/2007 to 1% in 2010/2011.

ABB, with proAsset and PSI acting as subcontractors, teamed up with Tecnicas Reunidas (appointed EPC contractor), is effectively commissioning the scope of work that includes:

- The Gas Management Centre (GMC) in Burgan, which handles data and critical parameters pertaining to the gas & condensate networks by an extended SCADA system.
- The Gas Management Information System (GMIS), whose applications provide history sheets/reports/critical messages and warning to various company levels for facing emergency and optimizing production.
- The Pipeline Management System (PMS), that provides Pipeline Leak Detection System (PLDS) using mass-balance & pressure-surge on major gas and condensate export pipelines. Estimation bases on quantitative & qualitative real-time data from flow-meters (ultrasonic, orifice, thermal mass flow), on-line gas chromatographs, color-meters, pressure instruments and valve status as well as applications like Scraper Tracking and others.
- Mass Balancing and Data Reconciliation: that reports the mass flow of the Gas and Condensate Network.
- Interface of existing Distributed Control Systems (installed at Gathering Centers and Booster Stations) with Remote Terminal Units, capturing real-time data related to critical flow, pressure & temperature on gas and condensate streams at critical locations (manifolds, export pipelines, flares, crossovers, etc).

Actually the amazing handling of information from remote nodes permits now monitoring and management of:

- Real-time flare gas quantity based on direct measurement instead of 'gas-balance'.
- Fast & accurate fluid-accounting/balance and re-conciliation with minimal human intervention.
- Warning for any leaks on aging pipelines having safety implications and exact hydrocarbon loss.

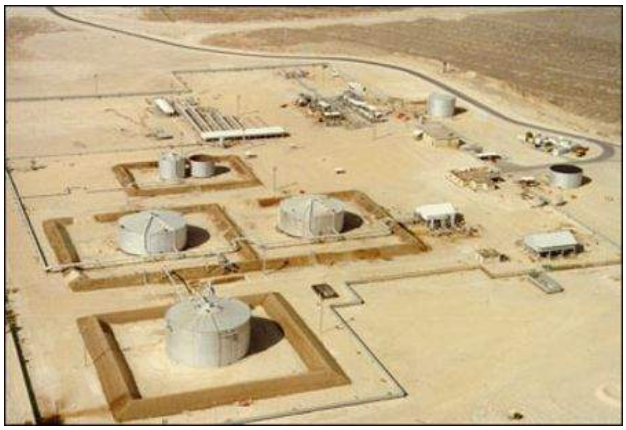
Data flow through a dedicated IP network based on existing KOC Fibre Optic Network using SDH technology with fibre optic extensions to remote locations and, in some cases, alternative connection like Leased Telephone Lines over PSTN.

PROJECT COVERAGE

Systems and Streams of the project are:

- 21 Gathering Centers Export Rich Gas (HP/LP) & Condensate Flare Gas.
- 4 Booster Stations Export HP Rich Gas & Condensate Flare Gas.
- 36 Field Stations.

which contribute to export Fuel Gas to KOC Installations, KNPC Refineries and Major Power Stations & Petrochemical Industries.



Gathering Centre

Applications provide:

- Promptly detection of leaks on 12 critical lines, permitting quick and effective reaction reducing risks to resources and environment.
- Remote control to shutdown the Pipelines under PLDS
- Monitor and control of supply/demand cycle.
- Remotely diverting of gas from one system to other.
- Reduction of flare gas.
- Accurate accounting and related billing information.
- Reporting using real time and historical data.
- Personnel Optimization.

Booster Station

The architecture of the Telemetry System is based on star topology network.
The central node is the GMC, which collects and processes information coming from remote nodes located in the periphery (i.e. the DCS in GC/BS and RTU in field stations).
Engine of the Telemetry System in the GMC are the applications processing and elaborating the information coming from each peripheral node (SCADA, Leak Detection System, Gas Management and Information System).
Standard interfaces and protocols assure the communication among existing and new equipments and enable the smoothly extension to cope additional nodes and pipelines networks.

OPC (Object Linking Environment for Process Control) provides interoperability between different vendor applications and between central and remote nodes whereas communication between SCADA and RTU's is based on IEC 870-5-104 standard protocol.

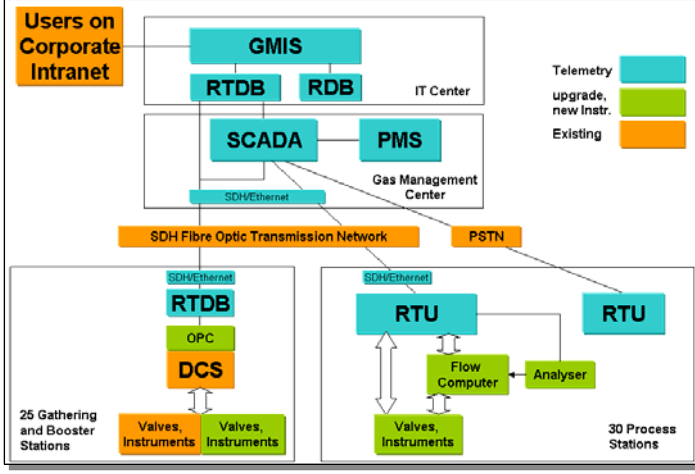
PROJECT BLOCK DIAGRAM

The block diagram below shows the main subsystems, their location and the communication protocols.

The following blocks are identified:

- KOC Users have direct access to GMIS output from their office computer in Company Corporate Network.
- IT Center with GMIS application, consisting of central Real Time Data Base (RTDB), Relational Data Base (RTD), application servers and WEB-server. Results are stored on a WEB-server and are accessible from Company Corporate Intranet.
- The Gas Management Center (GMC) hosts the real-time SCADA system for operation and the Pipeline Management System (PMS) including Pipeline Leak Detection System. Operators supervise, administrate and control the pipelines.
- The GMC is connected to field automation systems and centralizes applications via Company Transmission System. For the "last mile" between available Company Transmission System and RTU sites new fiber optic cable have been utilized.
- For communication between all applications only OPC and IEC RTU protocol on TCP/IP has been used.
- Alternate media like Leased Telephone Lines via Public Telecom provider have been used where laying of new fiber cable was not feasible or economically not convenient.

- Actually DCSs, at Gathering Centers and Booster Stations, extended the control to new instruments, providing the relevant data for Telemetry applications. The data exchange is provided via OPC interface protocol. Remote Real Time Data Base applications take over the data and transfer them to central applications.
- RTUs, located at field stations, are fed with batteries powered by solar panels whenever power supply is not available.They collect data from field instruments, flow computers and analyzers like gas chromatographs, color analyzers and moisture analyzers.



- RTDBs and RTUs can store data for more than 72h to bridge in case of communication loss.

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