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Eastone

Application Note

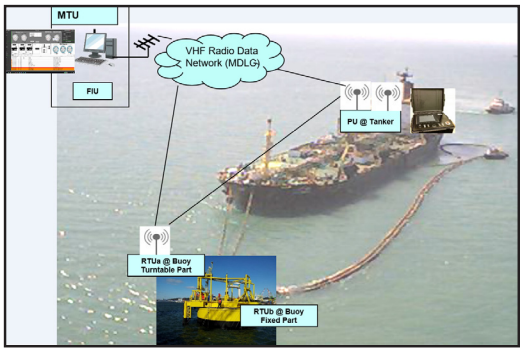
SPM Monitoring and Controls - Telemetry System for Mission Critical

General Overview and Background

Single Point Mooring (SPM) Monitoring Systems provide tanker masters and FPSO or shore-side control room operators with real-time operational and environmental data. The controls systems are in place to assist safe operations at FPSO mooring and tanker loading / offloading terminals.

The nature of the processes and the critical components that are involved in the Offloading dictate that the Design and Implementation of the Telemetry System will comply with the HIGHEST industry standards for Mission-Critical Applications. This must cover the mandatory requirements for Mission Critical Telemetry System, including accurate real-time information, high availability, and resiliency.

Easton Int'l and Star Controls have partnered in the design and the development of Next Generation Best in Class
Complete SPM Monitoring and Control System.



The system's main features include:

- Based on best of bread products
  - Motorola ACE3600 RTU (Remote Terminal Unit)
  - VTScada Software – SCADA Software
  - Beijer HMI – Local Display
  - Wireless Network
- Very high availability through unparalleled redundant scheme:
  - Hardware
  - Software
  - Communications
- Autonomous – the RTUs at the SPM can operate autonomously, even when communications with the remote-control points are lost
- Customizable – flexible to accommodate Customer's specific requirements
- Open Architecture – can accommodate additional equipment

Solutions Architecture

The Telemetry System comprises four main components:

- MTU (Master Telemetry Unit) - Located in the central control room. It allows remote monitoring and control of the buoy, using the VTScada screens and Alarm handling
- PU (Portable Unit) - a Portable unit that used for remote monitoring and the tanker's control room. The unit is carried by the navigator.
- RCUa and RCUb – these units are located at the SPM for local control and monitoring to communicate with the MTU and PU. RCUa is located on the SPM turntable, RCUb is situated in a buoy in the same compartment as the HPU (Hydraulic Pumping Unit).
  - RCUa monitors and controls all navigation (e.g., Foghorn, Marine Lantern) and power systems that are based on the turntable.
  - RCUa also monitors the two main safety parameters, the Mooring Hawser Load Pin and Pressure Transmitter in the offloading hose.
    - RCUa has a local display for a complete monitor, control and configure parameters.
    - RCUa acts as the buoy's wireless communication node with the MTU and PU.
  - RCUb monitor and Controls the HPU, and utilize advanced logic for safety interlocking
  - The RCUa and RCUb communicate through a serial link (i.e., RS-485 through the sliprings)

Communications

The four units use the Motorola MDLC protocol link. The wireless communications are provided by a broadband IP digital radio network that is responsible for establishing the IP link from any point.

- RCUa communicates (send/receive) alerts and control data by digital radio with the MTU.
- The MTU forwards it to the PU and vice versa.
- RCUa communicates with RCUb via RS-485 serial link.
- In case the Tanker is between the buoy and the central MTU, the RCUa switches the data through the PU using MDLC protocol, and Digital Radio System for communicating the data between PU and the MTU at the Central.

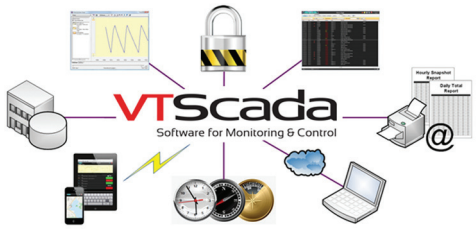
Best of Bread Components

- SCADA Software – VTScada software
  - The most advanced and user-friendly product
- RTU Motorola ACE3600
  - The “Rolls Royce” of the RTUs with huge installed base
- Top quality instrumentation
- Star Controls - wWell Recognized Best Industry Subject Matter, Experts

Motorola ACE3600

- Huge installed base
- Designed and built to withstand harsh environmental conditions
- Unparalleled robustness and resiliency
- Powerful process power and Large variety of hardware options
- Open platform – can interface any SCADA SW and field devices
- Motorola MDLC protocol – the “secret sauce”
- Designed mission-critical applications
- Any communication domain - support legacy, current, and future communications technologies
- RTU-to-RTU and multi-tasking communications
- Advance remote maintenance and upgrade
- Capable of host and execute any tailored logic or functions

VTScada SCADA Software



SCADA Controls Center – Main Features

The system provides the user different points to monitor and controls the buoy and the process. At the central computer runs the VTScada that includes several layers such as HMI, database, alerts and historical trending. The Database or the Tags, is the interface between the incoming data from the outside world. This database is the source for several outputs such as screens, alerts and saving history.

The Alerts screen provides the operator with all information, including:

- The ‘open’ alerts including the incoming date and time, and allow the acknowledge each alert.
- Once the alert is no longer valid, it will save to the history screen
- If the alert is still ‘open,’ it will be marked in a different color.
- The History trend used for statistics.
  - History trending can be done for the Analog measurements as well.

The Control Center SCADA including two levels of privileges. Level one for the Operator, and second Level for the Administrator. Each Level can enter has to enter by update his name and password.

Solution Features and Conclusions

Since the Telemetry System serves a Mission Critical Application, the following design and implementation guidelines were incorporated.

- High Availability – The system architecture and all components are designed and tested for very High Availability and resiliency This includes providing the crew in the field with powerful troubleshooting software tools.
- Simple to use by operators.
- Open architecture - the system can accommodate future technologies, functionalities and new wireless technologies.

Projects / References

Star Controls developed several systems that aim Mission Critical Applications and was able to deliver them to the complete satisfaction of the customers. The team is experts in Industrial Internet of Things (IIoT), SCADA/Telemetry, Wide-area Wireless Data Networks and Cyber Security.

The SPM was implemented in different projects around the globe. Star Controls provided, directly and through partners, several SPM systems that are operating in different around the world. To learn more, please visit www.star-controls.com or email sales@star-controls.com.

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