Designing a Highly Reliable Fiber Optic Communication Network in the Gulf of Mexico

Teledyne ODI

Interconnect

Product:
Modular Connectorized Distribution Unit (MCDU)

Application:
Subsea Data Transmission

Project:
BP GoM Fiber Optic Network

Client:
Tyco Electronics Subsea Communications (TE SubCom)

Background

In 2005, BP initiated a project to engineer and construct a fiber optic communication network in the Gulf of Mexico to provide an unprecedented level of high performance connectivity to deepwater wells. The backbone of the system was laid on the seabed in 2007 with actual service commencing in 2008. Communication service connected seven of BP's platforms with land-based operations located in Pascagoula, Mississippi, and Freeport, Texas. The 1216-km system reaches a depth of almost 2000 meters and has been many years in the making. The main asset of the system provides serviceability to the deep water wells in the event of severe weather including hurricanes.

What were the project challenges?

With the expectations for initial bandwidth of 10 Gb/s to seven primary platforms and future system expansion, the collaboration efforts between TE SubCom fiber optic systems and Teledyne Oil & Gas required careful coordination. The greatest technical challenge would be the integration of wet-mateable connectors at key locations throughout the system to enable expansion through the existing Umbilical Termination Assembly and connectivity to other equipment. The solution resulted in the development of the TOG Modular Connectorized Distribution Unit, MCDU, to provide circuit expansion within a standard frame that supports ROV intervention.

Subsea Structure Integration – Cable Vessel

Secondary Challenges: The TOG MCDU had to be designed to interface with standard TE SubCom components to enable the use of existing cable deployment equipment. The technical challenge would be interfacing the TOG MCDU with the TE SubCom repeater casing to form an optical distribution canister. Once assembled and integrated with telecommunications cable, the canister can easily be loaded and deployed from the cable vessel at sea without the need for special tooling. The distribution canister would be deployed at specific locations within the network to allow for future expansion.

What were the innovative technical solutions available for the project team?

Installation of telecommunication cable and system expansion at the seabed is not a new technology. TE SubCom has been manufacturing and installing cable for many years with extremely reliable service. Typically, if a system requires repair or expansion, the cable is brought back to the surface and prepared within a clean room environment onboard the cable vessel. While this type of work is highly reliable, it can be costly and down time must be a consideration. In the case of the BP GoM network, cable splicing would require specific expertise and significant costs, thereby reducing the promotion of future expansion. The TOG technical solution of the MCDU and wet-mateable connector provided a simpler method of system expansion. Future operators can access the system through the use of an ROV even while the network is operating.

Highlights:

- Teledyne ODI designed a modular distribution unit to allow for easy future expansion of a subsea data transmission network.
- Using the MCDU, the network can be expanded or repaired without retrieving the equipment back to the surface

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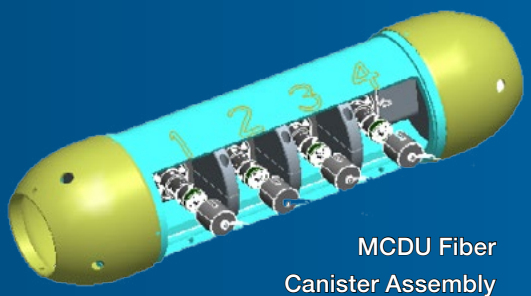
What was the final engineered technical solution?

The collaborative efforts between TE SubCom and TOG provided a unique solution in support of perhaps the greatest advancement in subsea systems communications. The use of highly reliable fiber optic technologies and wet-mateable connectors provided the design and expansion capabilities for the BP GoM fiber optic network. The integration of the TOG MCDU and the TE SubCom repeater casing resulted with a “standardized” component strategically placed at key locations throughout the network. With the deployed system operating since 2008 and proof-of-concept demonstrated during hurricane season, the oil and gas industry is beginning to understand the significance of real-time communications.

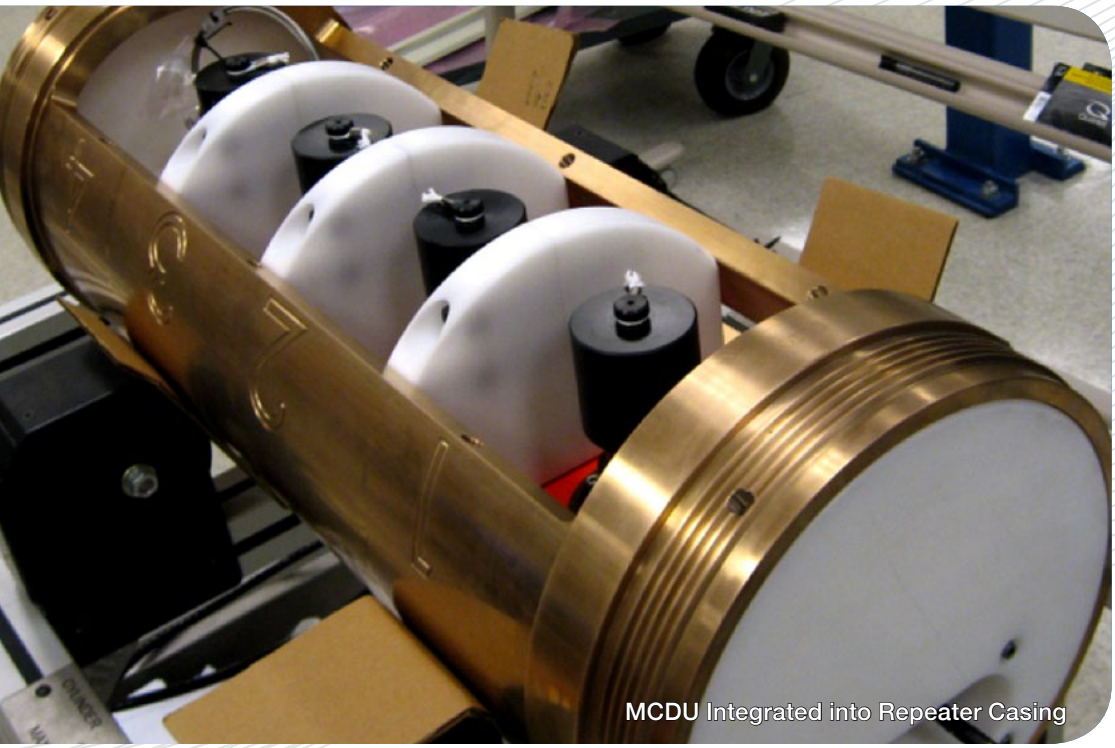
What were the benefits of selecting this particular approach/solution compared with the others proposed?

The benefits of the network have been demonstrated through the use of fiber optics providing more reliable bandwidth resulting in greater data transmission. With the rising costs of oil and gas development and new facilities becoming more automated, active system monitoring is becoming more essential. The use of extremely reliable optical technologies offers far more real-time system monitoring capabilities than conventional systems. With the advancement of fiber optic technology in the Oil and Gas industry, the use of high tech systems will require this type of capability. Initial installation costs of fiber optics can be higher than conventional methods; however, the benefits of real-time data and active monitoring will significantly reduce down time and operating costs. Surely this technology will become an ever increasing necessity in future operating systems and field developments.



MCDU Fiber
Canister Assembly

Subsea ROV Intervention – Mated Connector Set



MCDU Integrated into Repeater Casing

Customer Quotes on Solution

"This feels the same as when we went from dial-up to broadband," is how one user described the change when the BP Atlantis platform first started using the new fiber system.

"With the ability to deliver up to 10 gbps of connectivity to BP platforms with a latency of less than 20 ms, the system is showing an 80% reduction in application response times versus the existing satellite communications."

Products & Services:

- Electrical & Optical Wet-mate Interconnect Systems
- High Power Interface Solutions
- Subsea Distribution Systems
- New Product Development
- Cable Terminations

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