

Subsea Fibre and the Digital Oilfield –

Diving into Offshore Communications

For years, satellite technology has served offshore drilling operations by incorporating rigs into corporate communications infrastructures, even where wires and towers can't reach, and bringing them digitally closer to headquarters. However, as drilling technology continues to advance, the demand for bandwidth-intensive data transmissions from offshore operations to land has skyrocketed. To remain competitive, drillers now require real-time data regarding operations, and often times data needs to be collected from very remote, deep areas of the ocean.

BY RICK SIMONIAN

For certain operations, subsea fibre networks offer the most effective solution and the necessary bandwidth to provide real-time transmission of drilling and platform data, eliminating potential lag time for communications with headquarters.

Diving into Subsea Technology

A subsea fibre network consists of components on the seafloor and at the surface. On the seafloor, a collection of cables, junction boxes, repeaters and sensors serves as the primary channel for data and power transmission between platforms or between offshore and land operations. The backbone cable network can span hundreds or thousands of kilometres, providing power and high bandwidth fibre communications to a variety of IP-enabled devices on the seafloor at depths of more than 3,000 metres.

The cable is reinforced for subsea functionality and protection, and contains up to 24 optical fibres for optimal bandwidth plus the trans-

mission of DC power. Depending on the architecture of the system, a riser cable connects seafloor components to a buoy at the surface, housing an antenna that serves as a data access point for drilling platforms and subsea equipment. Alternatively, the subsea network can be terminated at a landfall site if conditions and permits allow.

Essentially, the high-bandwidth buoys on the surface are connected to an expansive network of sensors and seafloor nodes. The buoys pro-



vide power and communications to the network of seafloor nodes that allows real-time delivery of collected data to facilities anywhere around the globe.

When looking at a complete network for an offshore oilfield, this system may be multiplied to serve multiple platforms; however, all of these systems are connected by the subsea network, creating a larger, even more reliable network. For offshore operations, this means the ability to constantly monitor environ-

mental and operational factors and reliable connectivity with headquarters or regional locations. It also provides real time command and control of increasingly complex subsea processing equipment. And with that ability, comes more up-to-date information to create a significantly more efficient digital oilfield including advanced collaborative environ-

ments where experts can monitor many locations simultaneously.

Monitoring the Environment

For offshore drilling operations, the processes that take place before drilling ever begins are just as important as the day-to-day operations of a rig. The unique environment of offshore platforms presents a laundry list of considerations to the energy market. From climate changes to sea life, drilling operators maintain a responsibility to thoroughly examine a platform's impact and interaction with the surrounding marine ecosystem to avoid accidents that have the potential to not only break down the efficiency of operations, but could substantially tarnish a company's reputation.

A subsea fibre network gives valuable insight into the offshore ecosystem specific to a particular platform or cluster of platforms, enhancing construction processes and allowing the operator to account for weaknesses or considerations that may cause trouble



With more than 30 years of experience in supporting customers' operations in remote and harsh waters, solving difficult marine challenges is Harris CapRock's specialty (illustrations: Harris CapRock)

down the road. Ultimately, this makes for more efficient operations and less time spent addressing surprises.

Monitoring environmental conditions such as water currents, sediment collection and seismic activity would normally require many separate network components and costs which are easily consolidated into a fibre network. With information gathered in real time, safety and efficiency concerns that come with unexpected weather and marine activity are more easily avoided or compensated for. Historically this monitoring has been done through sporadic collections of data from temporary sensors, which does not provide a true picture of the subsea conditions.

Managing Operations from the Surface

For offshore operations, data-heavy media and information often account for too much of a platform's allocated bandwidth, leaving companies to regulate the flow of information based on importance. Incorporating subsea services into an offshore communications solution ensures that necessary operational and emergency communications are easily accounted for, and companies are able to build even more tools into their operations to better serve crew members at every level.

The trend in the industry is to explore deeper reserves that are farther offshore, and to place increasingly complicated oil and natural gas processing equipment directly on the seafloor. The bandwidth requirements for regulatory

compliance, safety, and operational efficiencies help close the business case for deploying a long-term subsea network that is going to be used by multiple operations in an area for many years.

Apart from enhancements to features such as closed-circuit television (CCTV) and increased Internet access for personal crew communications, business efficiencies are not limited to necessities. By implementing life of field seismic imaging, radar systems, long-range cameras, remote subsea intervention and custom sensors to address needs particular to a single platform, rig operators are able to better monitor all conditions associated with drilling operations to stay one step ahead of any unforeseen issues that may arise. These in turn will lead to better reservoir management and overall improved efficiency.

Moving Communications Below the Surface

To support critical missions for the digital oilfield, industrial enterprises need a portable and re-deployable subsea solution to collect crucial oceanographic data and pass real-time operational data that can save costs and reduce deployment timelines. Partnering with a service provider that can supply the equipment and implementation of the network and assist in monitoring and maintenance of the system is critical.

When choosing a provider, it's important to look into existing operations. Does the provider have an existing presence in geographic area of operations? Are they able to support and consolidate commu-



nications for both offshore and land-based drilling operations? Do they have a comprehensive customer assistance program to address and resolve issues quickly? Are they experienced in marine operations, and can they architect complex communication solutions and properly manage the suppliers?

A provider that has a strong presence in the regions of operation is more apt to quickly implement and set up an effective subsea fibre network utilising existing network infrastructure. Additionally, these providers are already familiar with the seafloor terrain and patterns for climate and marine activity that will affect network implementation and management.

For most drilling companies, offshore operations account for only a portion of their revenue. If a driller contracts separate service providers to support offshore and land-based communications, there is no guarantee that data retrieval will be consistent across the board. In fact, it's even possible that offshore data transmissions could arrive well before data from an onshore rig, adding lag time to the digital oilfield. Plus, separate service providers means more fees, which could easily be consolidated into one company with a network big enough to handle both types of communications.

Finally, as with all communications equipment, hardware malfunctions or the need for assistance in maintenance is common. That is why it's important to choose a service provider that offers a customer service team that can be reached 24/7, and if possible, offering local presence and support in the region of operations. ■

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Rick Simonian is president of Maritime Solutions at Harris CapRock Communications, a premier global provider of communications solutions for remote and harsh environments including the energy, government and maritime markets. Harris CapRock owns and operates a robust global infrastructure that includes teleports on six continents, five 24/7 customer service centres, AssuredCare customer service and network management program, local presence in 23 countries and more than 275 global field service personnel supporting customer locations across North America, Central and South America, Europe, West Africa and Asia-Pacific regions.

Harris CapRock has designed, deployed and managed subsea networks in the North Sea and in the Mediterranean Sea for more than 12 years in support of exploration and production activities, environmental monitoring and tsunami warning. Its systems operate at depths of more than 3,000 metres, and utilise a variety of types of power buoys, landfall solutions, sensors and network components. Its engineers and technicians are highly regarded for their global communications and systems expertise, their familiarity with deep sea operations and customer service, designing networks for virtually all of the world's remote regions.