EMBRACING AN IP ENVIRONMENT OFFSHORE

Stewart Ash (WFN Strategies), Glenn Duhig
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Email: sash@wfnstrategies.com

Company: WFN Strategies 21495 Ridgetop Circle, Suite 201 Sterling, VA 20166, USA

Abstract: Just offshore of the 2,000km stretch of coastline between Exmouth in Western Australia and Darwin in the Northern Territory on the North Coast of Australia is one of the major areas for oil & gas development in the world. Over AU$130 billion of offshore projects are either underway or in the planning stage and will come to fruition in the next few years. From a submarine cable systems perspective, it might be reasonable to assume that the operators of these offshore facilities would want to take advantage of the benefits that connectivity though high capacity submarine cables can bring. If this is true, the Australian northern coast should be a major market opportunity for the submarine cable industry, but is this the case?

This paper will look at some of the major cultural, environmental, financial and technical imperatives for the oil & gas companies, system suppliers and telecommunication carriers that will inform whether this potential market opportunity can be developed.

1. INTRODUCTION

All around the world oil and gas companies are searching further and further offshore to find new reserves. The costs associated with developing and operating these offshore fields are massive. Therefore, the operating companies need to find ways of minimising capital and operating costs if these new fields are to be viable. To those of us in the submarine cable industry, one obvious solution is increased remote control and monitoring through high capacity fibre optic cables. However, although a few major companies in the oil and gas industry have implemented submarine cable networks others have not and, for various reasons, have been much slower to embrace this technology. Why should this be? This paper will illustrate the issues that affect the oil and gas companies' choice of communication technology by using the example of the offshore developments along the Australian northern coastline between Exmouth and Darwin and consider the impact on this and other offshore submarine cable markets.

2. OIL & GAS ON AUSTRALIA'S NORTHERN COAST

This region of Australia is currently one of, if not the major offshore area for oil and gas development in the world. In the midst of these economically challenging times, Western Australia's petroleum sector is continuing to strengthen. An astonishing AU$130 billion worth of petroleum projects are currently under construction or are planned. The AU$12 billion Pluto project is nearing completion and will begin operations within months; added to this, the AU$50 billion Gorgon project, has been described as a "one project economic stimulus package". In addition, Western Australia boasts more than 130 trillion cubic feet of discovered gas reserves with large areas still unexplored. These gas reserves are concentrated in three main regions: the North West Shelf [NWS] and Carnarvon Basin, the Bonaparte Basin and the Browse/Canning Basins.

In 2008, the Western Australian Government processed a record number of exploration and mining leases with little sign of a slowdown in the market. Despite the economic downturn in the fiscal year 2008-09, activities in the Western Australian petroleum sector were extremely high; 25 development wells, 16 exploration wells and 14 appraisal wells were drilled that yielded an overall success rate of 18%.

3. THE BENEFITS OF FIBRE OVER ALTERNATIVE TECHNOLOGIES

The majority of the fields that are located offshore from the northern Australian coastline between Exmouth and Darwin lie 200 – 400km off the coast and are beyond the range of digital microwave; therefore the only viable communications technologies are fibre and satellites. The primary advantages that fibre offers compared to satellite are well known: increased capacity (virtually limitless), lower latency and security. However, it is important to understand how these advantages can translate into tangible commercial benefits for the oil or gas companies, when developing new offshore fields.

In this Australian offshore market, the vast majority of oil and gas companies are working on the NWS. The fields on the NWS are a mix of oil and gas in varying stages of development and maturity, from initial exploration through to fully operational fields, with declining reserves. The viability of new fields and the profitability of existing fields are inextricably linked to the global prices for oil and gas. As production fields mature, output falls and production efficiencies are required to maintain profitability for as long as possible. For new fields, the capital and annual operating costs are carefully evaluated through a process called Front End Engineering Design [FEED] and these are compared with projected market prices for oil and/or gas before a Final Investment Decision [FID] is made.

Only a submarine cable fibre system can deliver the necessary transmission capability with sufficient reliability to support software applications that provide remote monitoring and control of vital services on the offshore facility. If a submarine fibre optic cable solution is committed to early enough in the FEED program, this automation can contribute significant savings in the capital cost of the construction of offshore facilities by reducing the size and capacity of the human resource support functions on the platforms e.g. accommodation, cooking facilities, environmental controls, food storage, fresh water, sewage, waste storage and disposal. By reducing the required manning levels on the offshore facility the annual operating costs will also be reduced. The savings provided can be critical to the FID.

Automation will, in general, increase the operating efficiency and productivity of the offshore facility. However, one factor that is often overlooked when considering the operating efficiency of an offshore facility is the effectiveness of the personnel working on that facility. One of the few concessions to this important consideration is limiting the lengths of tours of duty. This is recognition that, over time, the effectiveness of personnel working in an offshore environment declines. Studies have shown that while some people can thrive in isolation, the majority of people need regular contact with other people and, in particular, family and loved ones to work effectively. If fibre allows an increase in automation and with it reduction in manning, then the opportunity for, and the variety of, human interaction for the personnel that do work on the platform will be reduced. However, with the bandwidth available over the submarine fibre cable, each person on the platform could be provided with a high

speed, broadband, internet connection allowing e-mail correspondence, telephone and video-phone communication through applications such as Skype, music & video downloads and distance learning. Not only will this allow a 21st century office environment on the platform, but there is little doubt that having these facilities will increase offshore personnel morale and maintain it longer which will directly affect the individuals' effectiveness.

The combination of these disparate applications means that offshore systems, where implemented, form part of a corporate WAN and so transmission is normally based on IP Ethernet rather than on the more traditional SDH/SONET architecture.

These benefits are not limited to the Australian offshore fields they are applicable anywhere. However, on a global basis only one major company appears to have fully embraced an IP environment offshore. Its decision was informed by experience gained of the benefits of fibre connectivity in the Gulf of Mexico. The company in question has initiated a corporate policy of designing all new offshore facilities assuming broadband, high speed data connectivity and, wherever practicable, retro-fitting submarine cable connections to existing platforms. This policy is based on quantified savings in capital and annual operating costs, plus significant, measured, production increases. The question is – Why aren't others doing the same?

4. SUBMARINE CABLE MARKET OPPORTUNITY

There are a number of major projects on the NWS going through FEED/FID evaluation process including, for example, the Wheatstone project. In the Carnarvon Basin, there are the Pluto LNG project; the Gorgon LNG Development, the Pilbara LNG project to develop the Scarborough Field. In the Browse Basin there are the Browse LNG Development to develop three fields in the area of Scott Reef and the Ichthys LNG Development.

These field developments should represent major opportunities for vendors associated with the submarine cable industry. It will, however, be less certain as to whether submarine fibre cables can offer cost effective benefits for existing facilities where platform to shore communications are already in place and the existing infrastructure on these platforms may not be able to accommodate a submarine cable connection. The size of this potential market will be strongly influenced by the FEED and FID programs of the offshore facilities to be designed and or modified over the next 3 to 4 years.

5. OIL AND GAS COMPANY PHILOSOPHY

While oil and gas companies are aware of submarine fibre cables, many are not structured to give this technology the attention it deserves and, consequently, have not reaped the full benefits that a submarine fibre cable can provide. There are a number of reasons for this. Firstly, in general, oil and gas companies focus on their core business and anything not seen as core business is outsourced. Telecommunications and IT tend to fall into this outsourced category. This situation means that most companies have small IT departments that do not have the skills to procure and operate a submarine cable and, in addition, they generally have very limited influence within the company. Secondly, although a submarine cable project for an offshore platform may run to tens of millions of US$, this will be small in comparison to the multi-billion US$ costs of the offshore field construction itself and, consequently, like all small projects, it will struggle for resources, fight to gain the support of all other internal departments that have differing interests and objectives, and have difficulty (when necessary) in securing the attention of the

key decision makers. Finally, in most locations, a submarine cable will require far more interaction with the primary engineering design effort for the platform compared with a satellite or microwave solution. Satellite or microwave will only require finding a suitable location on the superstructure to locate a dish or an antenna, whereas a cable will need to compete for valuable riser space and will need a defined route through the seabed equipment layout. This often requires some form of compromise and, given the prevailing culture, this can prove difficult.

The above issues are applicable to any offshore field anywhere; with one exception. When the platform is located in an area where exceptionally adverse weather conditions can be encountered, physical security becomes paramount. As the northern coastline of Australia between Exmouth and Darwin is an area subject to tropical revolving storms (cyclones), generally between the months of November and March, physical security should be a major factor for the operators to consider in the final choice of communications technology for NWS platforms and this should bias the decision towards a submarine cable solution. As has been demonstrated in the Gulf of Mexico, the high bandwidth service provided by fibre cables have enabled platform operators with the ability to "de-man" and "re-man" assets in much shorter times than have been previously possible when major storms do occur. These reduced re-manning times result in reduced "shut-in" production and multi-million dollar savings to the operating company.

As an overview, the oil and gas companies do recognise the need for corporate WAN solutions between their offshore platforms and major office/logistic centres, but not all are convinced by the benefits of low latency, high capacity fibre connections. Many of them would like to procure access to the WAN as a total service package that is cost effective over the lifetime of the field without having to be directly involved in the construction or operation of the solution, whether this is via satellite or a submarine link.

6. WIDE AREA NETWORKS REQUIREMENTS

Oil and gas companies operating floating or fixed assets off the Australian North coast require connectivity to Head Offices located in major coastal cities in Australia such as Perth and Darwin, and often further afield to corporate headquarters in other countries. These connections can be readily established with traditional satellite dishes located on the offshore asset and the roof of the Head Office. However, for a submarine fibre cable installed off the northern coastline and landed at a suitable "Point Of Interconnect" (POI) there remains a long terrestrial backhaul component to complete the connection. This is discussed in more detail in Section 7.

The other major design consideration for a WAN is that a point-to-point submarine cable will be a single point of failure. Therefore, to provide like for like restoration a second cable or ring network has to be considered. In the Australian market, the incumbent owned and operated terrestrial fibre network only has a single cable between Port Hedland and Darwin. For WAN connections to Darwin, this extends concerns about single points of failure from the submarine cable to the short comings of the existing terrestrial network. There are, however, redundant terrestrial fibre paths between Port Hedland and Perth in Western Australia. Perth and Darwin are interconnected via Adelaide, although this routing may present some IP based network issues.

Network resilience will always be of major importance if the maximum benefit is to be gained from fibre connectivity and the

Australian fields are not unique in this respect.

Oil and gas companies are used to collaborating to build and operate multi-billion dollar offshore facilities. The organisational and accounting procedures for such projects are geared to doing this, with each field usually being established as a separate business entity. They are not organised for collaborating on non-core business telecommunications projects that connect a number of fields (business units) for mutual benefit, but there are encouraging signs that this situation is beginning to change.

7. TERRESTRIAL FIBRE IN WESTERN AUSTRALIA

To the North of Perth there is only one terrestrial fibre network which is owned and operated by the incumbent Telco, namely Telstra Corporation. Pricing of this monopoly service is consequently not particularly attractive, especially to retail customers (as an aside, pricing is not that attractive to wholesale customers such as competing carriers either). A second carrier, NextGen Networks (a subsidiary company of the Leighton's Group), is in the process of building a terrestrial fibre cable backbone between Perth and Geraldton, funded by the Australian Federal Government. NextGen have made it public knowledge that they intend to complete the extension of this backbone between Geraldton and Darwin, although no timeframe for completion has been provided to date. Plans; however, are well advanced for a competing terrestrial fibre cable to be installed between Adelaide and Darwin by NextGen, and the company hopes to have this link finished and operating by 2012.

In addition, the Australian Federal Government's National Broadband Network [NBN] US$43B initiative, if implemented, should provide the platform for competitive, IP based, wholesale backhaul services on these terrestrial fibre routes in a timescale consistent with the needs of the new offshore fields by 2013/14.

Once again Australia is by no means unique in having remote POI or long terrestrial routes from the POI to major cities, neither is it unique in having limited or no competition for the provision of terrestrial telecom services. A number of the West African offshore fields have similar issues to resolve.

8. LEGISLATION

While Australia has well developed laws relating to submarine telecommunications cable under the Telecommunications Act 1997, submarine cables to offshore platforms located within the Australian Exclusive Economic Zone (EEZ) were not contemplated in the drafting of this legislation and so are not covered. At this point in time it is debateable as to whether this will ultimately be the appropriate legislation or whether the needs of submarine cables to offshore assets will be better addressed under the recently enacted Offshore Petroleum and Greenhouse Gas Storage Act. Additionally, it has yet to be considered whether submarine cables to offshore platforms would fall under the control of NBN.

9. SUBMARINE SYSTEM CABLE TECHNOLOGY AND SUPPLIERS

For the example market, all of the existing or undeveloped oil and gas fields are located in relatively shallow water less than 400km off the northern Australian coastline. Therefore, all the necessary technology and installation techniques to connect them to shore with unrepeatered submarine cable systems are qualified, field proven and available from at least four major suppliers. Also, a number of the new fields are close enough to each other that they could be interconnected by a ring network using unrepeatered spans.

For larger network configurations 'Backbone and Spur' repeatered networks using OADM branching units are available from two major suppliers. Therefore, all the necessary technology required to make these connections can be readily supplied!

It is fair to say that, on a global basis, offshore oil and gas projects are not core business to the submarine cable system suppliers. Although, the major suppliers put a significant amount of marketing effort into this market segment when there was a major downturn in the market for new transoceanic systems, it is by no means a mature market and, understandably, their marketing effort has declined as the market for the more traditional cable systems has recovered. Submarine system suppliers are ready and able to service the needs of platform operators for submarine cables connecting assets located along the Australian northern coastline, and in other areas of the world. However, many of the oil and gas companies are not comfortable with the concept of owning and operating such systems, so it is difficult for the suppliers to stimulate the market unless they are prepared to build and operate these systems themselves.

10. CARRIER PHILOSOPHY

While carriers in Australia are interested, in principle in providing services to these offshore facilities, only Telstra has any real experience with submarine cable systems, mainly with point-to-point international cables such as the recently installed Sydney to Hawaii system. Telstra's experience does not extend to systems that terminate on offshore platforms. The necessary additional expertise can, of course, be brought in to help them or other carriers to develop an accurate cost base and a suitable business approach to providing such services. For this to happen, however, the carriers would need to see a viable business opportunity to commit to such studies.

At the moment there are two major uncertainties for carriers to consider in developing any such business case. Firstly, as stated in Section 8, it has yet to be established which legislation will cover any such service provision and this represents an undefined risk. However, perhaps the more significant risk is whether such cables will come under the control of NBN. Carriers would be reluctant to invest in a submarine cable if, once built, ownership would have to be vested in NBN.

If a carrier was prepared to conduct a study to look at a suitable business model, it would be concerned with recovery or the capital cost of the submarine cable. This capital cost would need to be recovered from the platform operator, up-front or over the lifetime of the cable. Telstra's usual business approach to connecting remote businesses to its network is to charge an up-front capital contribution (often 100%) and then provide the customer with services required. In this model, the telecommunications network is expanded at the customer's expense and the customer effectively becomes a 'subscriber' to the monopoly service provider. This situation would not be conducive to the platform operator's requirements of cost effective services over the lifetime of the system.

While the carrier philosophy has been discussed here within the context of the Australian market, the issues are broadly similar for traditional telecoms carriers anywhere in the world.

11. CONCLUSIONS

There is clearly a potential market for submarine cable systems to offshore platforms along the Australian northern coastline and the technology is readily available to service it. Ideally the market should be developed on the basis of network designs that share capital costs

and provide mutual restoration. It is also clear that competition between service providers will be available on the terrestrial fibre network from POI to Head Office locations by the time these new offshore fields require WAN solutions. There is no doubt that the oil and gas companies will be able to achieve significant commercial benefits if they invest in a properly implemented WAN solution that is based on a submarine cable system. However, in so doing they will be expected to pay the capital cost, however and by whomever it is constructed. Therefore, it would seem sensible that they should retain control of the design and procurement process. By doing this they will ensure that the technical specification meets their final requirements and that value for money is achieved from the supply contract. The submarine cable supply contract can be built into the offshore asset construction program as a sub-project, with the specialist expertise required to manage it outsourced as necessary. This approach will have two major benefits for the platform operator, it will maximise the opportunity to build the broadband capability of the fibre cable into the FEED program for the platform, allowing optimisation of the capital build and annual operating cost before FID. Secondly, it will allow the platform operators to make the cable system available to WAN service providers in such a way that competitive pricing can be enjoyed over the lifetime of the cable. One approach for the Australian market would be to vest ownership of the cable, once installed, in NBN. This approach would avoid the potential problems of price inflation due to monopoly supply.

It is clear that the way this Australian, and similar offshore submarine cable markets, can best be stimulated is by motivating the oil and gas companies to embrace the benefits of an offshore IP environment, based on the broadband connectivity that submarine fibre cable systems can provide and factor the associated costs savings within FEED programs to inform FID; encourage them to collaborate with other platform operators to build networks that defray capital costs while providing mutual restoration; and, at the same time, help them to build commercial models that will allow them to outsource their complete corporate WAN requirements without sacrificing price competition.

