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The rise of Regional Networks

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The demand for regional submarine networks dominates our current market environment, although it has frequently been in the shadow of the longer, trans-oceanic systems. The industry has, however traditionally focused on the challenges presented by the more glamorous trans-oceanic, high capacity requirements. This has led to what many operators say is a mis-match in what they need for their network, compared to what the supply industry, offers them. Andy Bax, Head of Submarine Networks, Global Marine Systems Limited, considers what is being done to address this gap.

Regional systems are the side roads to the submarine trans-oceanic highways. They allow more countries to gain advantage by accessing cheap transcontinental submarine bandwidth gluts. Thirty-eight percent of the world's population lives within 100km of a coast line and so the impact of these regional builds are disproportionate to their size, for both the developed and developing worlds. For systems below 350-400km they often do not require any sub-sea signal amplification and are termed 'un-repeatered'. Beyond this, 'repeatered systems' require a powered cable, and land-based power feed equipment to power the signal amplification in the submerged repeaters. Clearly regional systems are as diverse in their technology as their owners are in their business models.

Various definitions have been given as to what constitutes a regional submarine network. Generally it is regarded as having a subsea route length of below 4000km and not needing the transmission 'tweaks' of an oceanic system in terms of dispersion, gain, tilt and other factors.

The market drivers for regional submarine capacity are as varied as the solutions. The reduction in system pricing has fuelled lower-capacity applications previously considered uneconomic for submarine cable solutions. Looking at the source of regional network contracts over the last two years shows that 56 percent were purchased by traditional customers (new and old style carriers), 7 percent were from diversified energy companies, 34 percent from companies not associated with fixed line provision, and 3 percent from alternative carriers in newly deregulated markets.

Irrespective of the type of customer who buys them, regional submarine networks meet one or a combination of the following business needs:

- Relief of a regional capacity bottleneck for traditional carriers
- Demand for higher capacity data links between offshore oil and gas platforms to support de-manning and new applications such as 4-D seismic
- The long awaited 'killer applications' including HDTV, 3G, Mobile TV, Secure media on demand distribution networks
- International backhaul for mobile networks.

- Carriers emerging from Chapter XI with delayed CAPEX plans who need to implement targeted new system build in response to new regional capacity sales.
- Requirements to support new technology and 'off shoring' industries in lesser-developed countries with limited bandwidth infrastructure
- High-reliability links for supporting critical operations such as satellite telemetry
- International connectivity for alternative carriers in deregulating markets
- Supporting the international tourist industry in their wish to take their office with them on vacation
- Replacement of low-capacity networks that are uneconomic to maintain following the collapse of capacity pricing
- Secure or dedicated government networks
- Alternatives to terrestrial new build as price per km of construction is lower and implementation times faster.

The single, unifying factor between these diverse customers is their fundamental need for regional connectivity that is cheap to implement, and reliable; and simple and cheap to operate and upgrade as their capacity needs grow. Bandwidth demand is growing, at a conservative rate of 5-10 percent per annum.. However, this growth is not being reflected in bandwidth pricing, in fact the reverse can still apply. Thus typically for every 1 percent that a carrier loses in revenue due to capacity price erosion they need to recover 150m Euro in operational cost savings. The price and time pressures in this market are substantial.

The mismatch between the needs of the new regional system operator and the traditional submarine system solutions already mentioned deserves closer inspection. The first commercial challenge is the formulation and the financing of the business plan. Regional networks, with their more modest capital requirements regionally-driven demand and faster implementation, are generally easier to fund than trans-oceanic systems. However, financiers still require extremely robust risk analyses, sustainable operational business plan and short payback periods before they are convinced to allow access to their Venture Capital money mountain.

Another challenge is to minimise operation and maintenance (O&M) costs. With the majority of marine maintenance agreements operating on a capacity-independent per km charge structure, lower capacity regional networks incur a much higher O&M charge per bit than "trans-oceanic systems. This is further complicated for a regional repeatered systems that require different techniques and equipment to maintain compared to the terrestrial network.

There is a major commercial challenge in that the cable owner can only meet its long-term business directives if it can sell and provision additional capacity at a profit. However traditional repeatered systems capacity is added only in large bandwidth steps and is expensive and time-consuming to provision. Furthermore, they are often the sole domain of the original supplier to price and implement, reducing competitive pressures.

The final challenge occurs when the length of the regional network is just too long to be achievable by un-repeatered technology. Then it requires more expensive cable, submerged amplifiers and associated power feeding and test equipment. It also needs an approach to the operation and control of the repeatered equipment that is different to their terrestrial network. On that basis, a system that is only a few kilometers beyond the un-repeatered limit will incur total costs that are typically 60 to 100 percent higher than if it had been achieved using a terrestrial un-repeatered solution.

The commercial challenges are therefore closely related to the solution of the technical mis-match challenges.

The first technical challenge is to make the un-repeatered system stretch as far a possible. Just over a decade ago a typical un-repeatered span limit was 150km at an STM-1 (155MBps) 3-level. Modern un-repeatered systems have developed many techniques since to increase both capacity and system length. Many of the suppliers of terrestrial optical equipment such as Cienna, Huawei, Lucent, Marconi, Nortel, Siemens, ZTE, offer features that can be used by system integrators to provide not only a cheap solution (as the high volume of the terrestrial market allows lower equipment costs) but one that is operationally elegant as it matches the rest of the customer's network in terms of operation and support requirements.

Although the recent pricing levels of repeatered systems have decreased significantly, this has been principally due to inventory stock 'fire sales' rather than any fundamental value engineering exercise that is sustainable.

Regional systems need fundamentally different solutions than just offering trans-oceanic equipment with less cable! Some lip service has been paid to this with simplifying repeaters and re-packaging the same transmission equipment design in a smaller footprint. They are, however, still distinct from the terrestrial systems that they feed in technical approach, cost base, and O&M solutions.

Even the two submarine conferences of 2004 were still dominated with papers describing 10 Gbps by 128 wavelengths, 7000km type solutions - technically interesting but not what operators need. One customer compared this to being forced to listen to presentations on the features of rambling mansion houses when all they wanted was a cheap to run bungalow!

Regional operators, like all carriers, want connectivity that meets the 4S of telecoms: Super-Cost Effective, Simple, Secure and Scalable.

Regional submarine networks offer the potential to meet these needs and be the core business of our industry for the foreseeable future. However, the great variation in regional system requirements needs commercial and technical solutions that are much more flexible than those designed to meet the needs of trans-oceanic systems. The alternative satellite solutions, although lower in capacity and availability, offer quick and cheap to implement solutions, although the ongoing operational costs can be prohibitive for larger bandwidths.

For repeatered systems the solution to the commercial and technical challenges is much more fundamental than value-engineering the traditional submarine solution. The customer needs to be offered the advantages of the un-repeatered system in terms of 'look and feel' of the terrestrial network and fast and simple upgrade paths for all regional networks, irrespective of their length.

The supply industry must rise to these mis-match challenges. Global Marine is no exception, only through minimising the cost of our Guardian O&M solutions and working closely with our partners to sustain the cost and operational advantages of our Regional Submarine Network product can we expect the regional operators to chose submarine over satellite solutions to their connectivity needs.