

## EVOLUTION OF CUSTOMER NEEDS FOR MAINTENANCE SUPPORT SERVICES FOR SUBMARINE NETWORKS

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**Abstract:** As business models and technology trends for submarine networks have evolved, the needs of system owners for support have also changed and suppliers have adapted their support and service organisations to meet system owners' expectations. The changes have been gradual but, in some cases, are significant. The portfolio of maintenance support services now covers a wide range of operations and maintenance activities. Service level agreements including key performance indicators give both the owner and the supplier a common and clear understanding of the expected and actual performance of maintenance support services. This paper gives an overview of the evolution of these support services, and presents some thoughts on possible future trends.

### 1 INTRODUCTION

Following acceptance by the customer of a submarine network, the longest active phase of the supplier/customer relationship begins – the customer support phase. Most contracts include a condition specifying the customer's expectation for long term support, usually linked to the design life of the system which means up to 25 years. In fact, it could be more - as when a system is decommissioned, the supplier can be required to assist in the safe disposal of the supplied equipment, which may remain in situ for some time after commercial operation has ended.

This paper looks at how the support relationship with the customer has evolved over the past decade.

### 2 HOW IT USED TO BE

Not so long ago submarine systems were point-to-point (SLTE to SLTE) networks; the operators were the established telecoms operators, mostly incumbent PTT's with in-house engineering and technical departments that were actively involved with the design of the cable system. Furthermore, system owners took on full

responsibility for the maintenance of the submarine system, developing tools and processes independently of the supplier to operate and maintain their network. The system owners also owned and operated maintenance vessels for marine repairs. Supplier involvement was more or less limited to providing equipment repairs and supplying additional equipment (mostly cable) on demand.

With contract warranty periods of five years, there was little commercial activity on maintenance services in the early life of the system, which was carried through into the post warranty phase. Generally, the supplier's customer services or support department comprised a few persons of a 'certain age' reacting to customer's requests for support - most likely for a hardware unit repair, supply of additional components or general product advice.

Before the widespread availability of ISDN lines, on-site interventions to resolve system problems took time to arrange, were expensive and not, in all cases, effective. Therefore, system owners had to be self-sufficient to deal with problems on their networks in order to minimize any

traffic impact or system downtime for their customers. Admittedly, there was less traffic to impact but it was still significant.

### 3 WHAT'S CHANGED

Liberalisation and globalisation of telecommunications markets has brought new owners into the submarine system marketplace. Technical innovations and advances in telecommunications networks have increased the capacity and complexity of submarine technology.

#### 3.1 System Ownership

Submarine cable system owners can be segmented into different groups, each with different business drivers and demands:

**Traditional telecoms operator** – typically a PTT or private operator with technical, commercial and operations teams that are familiar with the submarine cable operations and incorporate submarine links into their network.

**New operators** - typically entrepreneurial groups with no engineering or technical infrastructure, focused on generating revenue from commercial operation as early as possible with the minimum of costs. These operators use external expertise and experience to set up their networks and are likely to ask the system supplier to include operations and maintenance as part of the system supply contract.

**Scientific institutions and oil & gas operators** – sometimes invest in submarine cables as part of their own telecoms infrastructure. These cables do not carry commercial traffic but are used for transferring essential information and data relating to their business (or research). The business model for these owners is based on outsourced and managed services and they expect submarine system suppliers to follow this model.

#### 3.2 Outsourcing

In line with most businesses, even the traditional telecoms operator now expects

to focus on its core business - selling capacity and added value services - and chooses to outsource, wherever possible, non-core business such as technical and maintenance activities.

Marine maintenance services - a high value essential service - are almost exclusively outsourced. Marine maintenance vessel ownership has shifted in the most part from the telecom operators to private and independent ship operators or the system suppliers.

Even traditional telecoms operators deliver this type of message regarding outsourcing non-core services to the business community. As competition increases in the telecoms market, all operators look for ways to reduce costs, improve margins and develop new services in their core business.

#### 3.3 Technology

Telecoms networks are designed as integrated networks, including terrestrial and submarine links, since capacity is required city to city rather than coast to coast. Networks are managed centrally from operations centres, geographically remote from the cables; in some cases, cable stations are unmanned. This has introduced more software applications into submarine networks and integrated network management systems are an essential part of the submarine cable system.

Advances in DCN products introduced the ability to make remote connections to networks. Leased ISDN lines have been replaced by VPN connections which allow faster and wider access at low cost.

In this age of global communications, system owners expect that support services can be delivered remotely. Geographic location is no longer a barrier for access to support.

Networks are designed to be upgraded on demand to meet end customer needs, so system owners expect to be able to add

capacity in short timescales and without disruption to existing traffic. When system owners allow it, remote connections can now be used by the system supplier to get actual system data to help plan and implement upgrades, thereby minimizing costs and time.

**What has not changed** is the expectation that submarine cable systems have a long design life and 25 years is still the standard requirement for new cables. System owners truly expect suppliers to offer long term or even lifetime support for the delivered systems.

#### **4 WHAT DO TODAY'S OWNERS EXPECT AND WHAT DO SUPPLIERS DELIVER?**

Based on market research data [1], just under two thirds of submarine cables in service in 2009 are over 10 years old. A quarter of the systems in service are between 15 and 20 years old and only the oldest of these cables are expected to come out of service soon.

Therefore system owners expect maintenance support services to cover a range of legacy technologies in addition to currently deployed technology.

Like all 21<sup>st</sup> century customers, submarine system owners expect 'service'. As a service is intangible, it is sometimes difficult to define and agree measureable performance standards for service delivery. The Service Level Agreement (SLA) is now an essential and established part of a telecom operator's business with its customers. End users of telecom products or services still expect the highest levels of reliability/availability. For example, the so-called 'five nines', or 99.999% availability is a typical key performance indicator (KPI) and system owners expect system performance, including maintenance services, to support this service level. Some system owners also consider transferring the responsibility of 99.999% availability to the system supplier -

depending on the costs and their risk strategy.

For both the owner and supplier a clear view of the performance levels for support should deliver greater efficiency and effectiveness. As such, the use of service level agreements for maintenance support services is now standard practice for most submarine system owners and suppliers, both during and after the warranty period.

To illustrate this trend, over the past ten years the number of service contracts for ASN maintenance support services (excluding marine maintenance service) has grown significantly. Services include operations and maintenance (O&M), advice and coaching, technical assistance, hardware repairs and logistics including parts storage and distribution. In response to owners' requests, system suppliers have developed complementary services delivered by resources from their technical support centres such as refresh training, fault localization and chromatic dispersion management. System suppliers that offer a marine maintenance service have also developed ancillary services such as maintenance administration providing access to system technical data on secure intranet sites, management of spare plant and joint kits, and cable awareness services.

##### **4.1 Access to Support 24/7/365**

The 24/7 support window for technical assistance is now the norm for technical support for submarine networks. Global businesses expect access to supplier support at all times, irrespective of time zone differences, national holidays and weekends.

Remote access gives the system owner/operator on-line expert help and assistance leading to faster resolution of problems. VPN access gives cheaper and faster remote access (subject to owner's security policy, firewalls, etc.). The supplier's support staff does not have to be in fixed location to give support. For

example, technical support staff on call may answer the first request for assistance and make the first assessment of the problem via a remote connection to the network from their home. Even though complex problems may require support from a wider range of skills and resources available during the supplier's local working hours, an action plan for problem neutralization can often be agreed and communicated directly to the system owner/operator immediately, then followed up in normal working hours.

The evolution described above is now fairly standard for submarine operators. But there are also other maintenance services and products that operators have expressed interest in but have not to date been developed by the suppliers, such as:

- 'Non-core business' maintenance services
- Universal spares
- Spares leasing service.

#### **4.2 Non-Core Business Services To Reduce OPEX**

*"Focusing on core business"* is perhaps one of the most frequently used terms in operators' strategic plans. In the current global economic crisis, some operators may consider that linear improvements in their current operations will not deliver growth without some reduction in cost structure. Over the past few years, outsourcing of network operations and services has become part of the operators' strategy to reduce OPEX. In 2009 there were two major network operations outsourcing deals: Bharti's deal with Alcatel-Lucent for its fixed network in India, and Sprint Nextel's deal with Ericsson in the USA. Whilst Sprint Nextel did not specify the cost savings, one analyst estimated that network outsourcing and reshuffling employees would deliver annual saving of \$100M.

On a much smaller scale, submarine cable operators are also looking at outsourcing

some of their operations and maintenance activities, particularly new cable operators in emerging countries. Invitations to tender for some systems request system suppliers to propose build-operate-manage or transfer solutions. However, the outsourcing network operations model for submarine cable systems is not quite as efficient. This is mainly due to the geographic distribution of cable landings in different countries which means that staffing numbers in each country are low. First level maintenance support teams in a cable landing station comprise two or three persons, and the opportunities to share this resource and reduce the cost are limited.

Therefore, unless the O&M organization is based in the country of the supplier, taking on first level O&M responsibilities does not offer the submarine cable supplier an opportunity for economies of scale.

#### **4.3 Universal Spares**

It is now twenty years since the submarine cable operators and suppliers developed the Universal Jointing (UJ) technology solution for installation and maintenance of submarine cables, which is still deployed by most cable operators around the world. This co-operation has not continued on developments for other maintenance solutions. Development of universal spare cable and repeaters does not appear to be an essential need for operators but we should not rule this out in the future.

The driver for the universal jointing technology was cost efficiency. Common technology reduces the capital expenditure (CAPEX) budget as common tools and parts can be used for jointing any manufacturer's cables. Another way to reduce CAPEX for maintenance is to lease rather than purchase spare equipment, which is an established service in other industries.

#### **4.4 Spares Leasing To Reduce CAPEX**

The maintenance model for submarine cables is based on the owner buying and holding all the spare part necessary for

repairs during the life of the system. Under this model, spares inventory costs are significant and operators would naturally like to find a way to reduce this, especially when system reliability rates are high and the probability of using spares is low. Some of the models used for terrestrial networks give rise to an expectation that submarine cable suppliers should be able to offer leasing arrangements for both station equipment and wet plant spares.

However, due to the lower equipment quantities deployed on submarine cable systems and the customized designs, it has been difficult to generate economies of scale for such services and therefore a competitive annual leasing cost. Turnkey submarine cable project system business models are project based, managing working capital over 1-2 years. A leasing model requires initial capital investment and returns over a much longer period, possibly 10 years or more. The risk/reward equilibrium point between supplier and operator has not yet been found for this type of service.

Last but not least, both operators and suppliers expect they will have to continue adapt maintenance services to ensure they are in line with the environmental and eco-sustainable objectives of their organisations.

#### **4.5 Eco-sustainability and Environmental Awareness**

Environmental awareness has increased significantly over the last few years. Operators and suppliers are faced with the challenge of how to be green to satisfy shareholders and be seen as positive corporate citizens while at the same time saving money. European suppliers are now subject to compliance with environmental directives such as the Waste Electrical and Electronic Equipment (WEEE) directive [2], which obliges the system supplier to ensure that telecommunications equipment can be disposed of safely at the end of its useful life. More generally, and particularly in the marine environment,

system owners are also obliged to comply with local and national codes of practice for scrapping and disposal of out of service equipment. System suppliers are expected to provide advice on what can and cannot be done with all the components of a submarine network. We expect this will become a higher priority in the future.

#### **5 SUMMARY AND CONCLUSION**

As the owners/operators of submarine networks are relatively few compared to other businesses, it has been possible for system suppliers to establish and maintain long term personal relationships with most customers. Suppliers are now regular participants in O&M meetings, providing reports and analysis of performance of the submarine network and identifying areas for improvement and optimization.

Supplier support services are now used to fill skills and experience gaps in their customer's O&M organizations. This ranges from simple tasks such as data and documentation management to more complex O&M services such as fault localization, marine repair planning, software updates, spares testing, health checks, path provisioning and network restoration planning.

The growth of global communications technology and applications over the past decade has created opportunities to improve support. To continue to improve and to deliver best value maintenance support in the future, we (both the operator and supplier) will need to look more carefully at the risk-sharing business model options for services.

#### **6 REFERENCES**

- [1] Telegeography Research Publication Global Bandwidth 2009
- [2] European Commission Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE)