THE IMPORTANCE OF BASE PORT LOCATIONS AND THE IMPACT ON TOTAL COST OF OWNERSHIP FOR MARINE MAINTENANCE SOLUTIONS

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Abstract: For many years, base port locations for the world's marine maintenance fleet were determined by cable depot locations supporting major cable systems.

This paper will review recent changes within the marine maintenance market, examine the Total Cost of Ownership (TCO) model for marine maintenance solutions, and explain how new base port locations can have a positive impact on maintenance and installation TCO for cable owners both in terms of reduced costs and reduced system downtime caused by external aggression.

1 INTRODUCTION

With 120 to 150 annual worldwide cable repairs, the accumulated system downtime is significant. The duration of the system downtime is dictated by the repair time, which is subject to repair vessel availability, proximity and quality. Whilst both availability and quality are common comparison parameters, less focus is normally given to the proximity of the repair vessel(s) to the areas of high fault probability.

Traditionally incumbent operators used to own and operate their own fleet of installation and maintenance vessels as well as their own cable depot(s). In that specific context, submarine systems were maintained by vessels, whose base port was historically dictated by the location of existing cable depots.

This historical structure still exists in Brest, where France Telecom own and operates a depot and a FTM owned and operated maintenance vessel is stationed there servicing the Atlantic Cable Maintenance Agreement. Similar set-up's exist in among other places Yokohama (KDDI), Busan South Korea (KT). Other incumbent operators like TDC, Telefonica, TIS, AT&T and BT have sold their marine affiliates to focus on their core activities.

In recent years new depots have been established in Taiwan and Cape Verde to address changed market conditions.

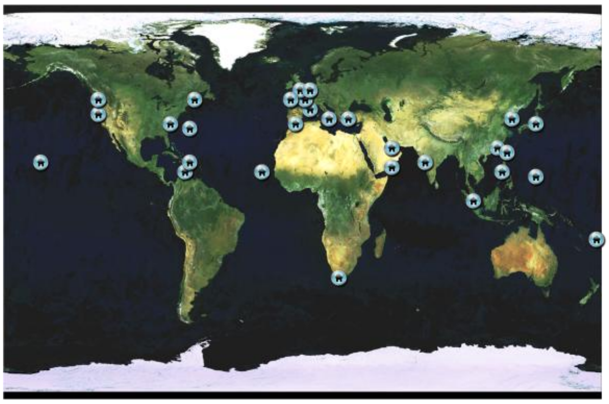

Fig. 1 Major WW Cable Depots

2 CHANGED REQUIREMENTS

The decreasing capacity prices have forced system owners to keep a constant focus on cost, which in turn has encouraged maintenance providers to develop innovative solutions offering faster and more cost-effective repairs.

In addition to the drop in capacity prices, the changes have been driven by technology advances, changing geographic distribution of submarine cables and other external events that have influenced cable and vessel security arrangements.

New submarine systems are designed to transmit more than 1 Tb/s per fiber pair and upgrades on existing systems allows substantial increase of the system capacity.

Several high capacity systems such as EASSy, TEAMS, WACS and ACE have recently been deployed on both sides of the African continent offering increased access to the international broadband network at a lower cost per bit, but also providing redundancy and diversity to the international traffic routing. However, it also changes the requirements in terms of marine maintenance solutions.

Whilst mesh networking technology is improving most operators' redundancy and restoration plans, the higher capacity carried on newer systems significantly increases the restoration requirements making speedy repairs even more important. Connectivity has been a major recent driver, cable systems like WACS and ACE have connected around 15 countries to the internet for the first time. For these recently connected countries with no resilience, Time To Repair (i.e. closeness of base port, spares on board etc.) is a critical parameter.

Fig. 2 WW Submarine Cables map

Therefore, mobilisation time, transit time and total time to repair remain critical factors for a high quality maintenance service and the location of the base port can have a significant impact on service delivery times and costs.

Take the Atlantic region and a cable off Ghana as an example. Before year 2012 the service for such a cable would have to come from either North Europe (Brest / Calais / Portland) or South Africa (Cape Town), which would increase the transit time to the repair site by 6 or 3 days respectively with a similar delay to restore traffic compared to a vessel coming from Cape Verde. Further, as this extra transit has to be performed twice it adds a significant additional cost in the order of 225 – 450 kUSD to the total cost of the repair.

As a reaction, the industry has seen cable maintenance depots being established in Calais, Taiwan and most recently Cape Verde to address the changing requirements as well as the changing patterns in marine activities.

3 TOTAL COST OF OWNERSHIP (TCO)

Traditionally, one of the key commercial criteria for the evaluation and selection of a marine maintenance solution has been the lowest annual fee, whereas less focus has been given to the Total Cost of Ownership. A TCO simulation model can calculate the total cost over the duration of a specific marine maintenance agreement.

The TCO for a Marine Maintenance solution includes all fixed costs:

- Annual Fee
- Eventual Membership Fee
- Spares Storage

And variable costs:

- Spares replenishment
- Repair costs
- UJ Kits
- Attending meetings

As most marine maintenance agreements are long term (3-5 years) the Total Cost of Ownership can vary significantly.

The fixed costs are not necessarily the biggest element in terms of value as repair costs can in some years easily exceed the fixed costs.

3.1 TCO - Fixed costs

The fixed cost element is normally the criteria, which draws most focus. The largest part of the fixed costs is the annual fee, which in some agreements are fixed during the term of the contract, whilst it fluctuates in other agreements, when cable systems either exit or join the collective agreement. Additionally, there may be annual inflationary rate increases applied to the annual fee. In some agreements a membership fee is charged in addition to the annual fee. The Annual Fee is normally proportional to the total system length. Distance between a cable and the maintenance solution's base port can also influence the annual fee (A discount may apply if distance from base port exceeds a given size). Prices for spares storage fluctuates mainly with geographic region.

3.2 TCO - Variable Costs

The variable costs, or cost incurred, are mainly associated with repair operations, although there are costs associated with meeting activity in relation to some marine maintenance agreements. The Repair costs are the biggest element of the variable costs.

Repair costs:

- Vessel Day rate
- Running Costs (Fuel and Lubes)
- Security Personnel
- UJ Kits
- Permitting
- Loading/Discharging of spares
- Harbour Fees

The geographical areas, where costs for required Permitting and Security are growing, are increasing, posing a serious risk to prolonged system downtime and expensive repairs.

The repair costs (Day rate and Running Costs) are proportional to the number of days during which the vessel is away from base port; The equation: distance from base port to repair site and from repair site to base port will give the number of days that will be charged. Thus, the distance from base port to repair site expressed in days becomes a key factor when calculating the Total Cost of Ownership.

3.3 TCO - System Downtime

In addition to calculating costs, the TCO model will calculate a theoretical system down time over the term of the marine maintenance agreement. Since system downtime means loss of revenue, this number is crucial in determining the best marine maintenance solution for a given system or to suggest optimal geographical base port location from a pure repair perspective.

The utilisation/service availability of the respective maintenance solution is also taken into account to reflect the risk of eventual queuing for access to a cable ship.

3.4 TCO – Data input

To compute the TCO, an individual cable system's fault history is combined with known hazards such as seismic activity and other seabed user activity to forecast the probable frequency, severity and location of faults and consequently the cost of repairs for the term of the contract.

When simulating base port locations for a number of systems the collective fault data for these systems are used.

3.5 TCO – Data Output

The TCO model can thus be used to compare and determine the most economically effective maintenance solution for the cable by simulating repair scenarios based on different maintenance vessels, utilisation/service availability and depot location.

The TCO output includes:

- Estimated repair costs over the term of the agreement.
- Estimated system downtime over the term of the agreement.

4 TCO - CONCLUSION

The model is an excellent tool for a specific cable system to evaluate different marine maintenance solutions and make a quantified assessment of the total cost of ownership over a longer period. Hence, it can also be used for budgeting purposes – not only in terms of costs, but also in terms of system down time and thereby redundancy and restoration requirements.

The simulation can also be used to evaluate base port and depot locations for specific marine maintenance agreements and thereby potentially result in significant cost savings and reduced system down time for the individual cable owners as well as improving the overall availability of the service in the maintenance agreement as less valuable cable ship time is spend on unnecessary long transits.

With the continuing pressure to reduce cost on the Operators' side combined with the increased costs of operating marine maintenance vessels new models must be developed and the current method of operation reviewed.