

# A NEW PARADIGM FOR RESPONSIVE SUBMARINE CABLE REPAIR

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**Abstract:** With the increased dependence upon Submarine Telecommunications Systems for world wide connectivity, the pressure to rapidly restore damaged systems to service is greater than ever. Since Sub Optic 2001, the maintenance assets worldwide have been dramatically reduced in number due to removal from service and redeployment to other markets. In the midst of this turmoil, the operational models for maintenance and repair of submarine cables have remained unchanged. This paper reviews the current state of the marine industry This paper will also present potential contracting methodologies to enable a return to service of damaged cables in the earliest timeframe when conventional assets are unavailable due to geographic or alternative use considerations.

## 1. THE ENVIRONMENT

The marine telecommunications industry is far more complex following the halcyon days of the internet boom and after the internet bubble burst. Many pressures exist both within the industry and outside it, leading to a challenging commercial environment for cable owners, installers and maintainers and lower tier suppliers and vendors.

## 2. PRESSURE TO RESTORE SYSTEMS FOLLOWING A CABLE SYSTEM FAULT

The everyday dependence on reliable telecommunications connectivity has become one of life's essentials. The demonstrated high level of communications performance, coupled with transparent system redundancy, has bolstered consumer confidence and transformed the internet into a reliable personal communication and business tool. Consequently, the pressure to rapidly restore damaged cable systems to service is greater than ever. Evidenced by the Boxing Day earthquake damage in Asia, rerouting voice traffic over alternative service means can provide some relief after a failure, but the magnitude of the damage over multiple cables created a bottleneck which isolated, from an internet perspective, large groups of users in Hong Kong and China. Subsequently, calls for regulatory investigations into reliability and redundancy for telecommunications systems have been heard. The simultaneous failure of 7 submarine cable systems was unprecedented and clearly beyond any maintenance planning model. Now that the cables have all been repaired, the cable maintenance planning models are likely to be reviewed and reevaluated.

## 3. ECONOMIC PRESSURE ON CABLE SYSTEM OWNERS AND OPERATORS

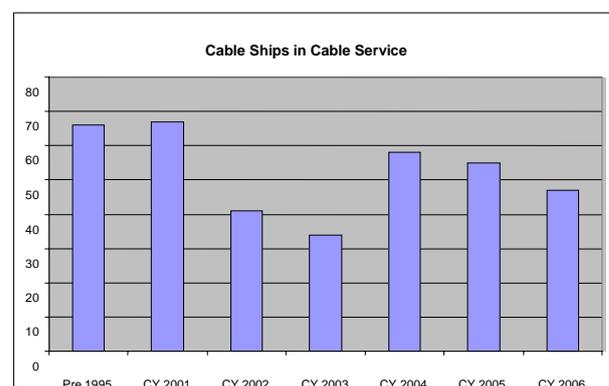
The economic pressures on cable operators have greatly increased with the downturn in capacity prices while the costs of maintaining a system remain fixed or increasing depending on the particular maintenance strategy the system operator employs.

Further, the economic impact on an operator experiencing a faulted cable can be significant given that the operator must arrange for alternative service which could involve unanticipated costs for communications transport.

"In terms of lost business, that amount will exceed the amount for repairs," Rob Enderle, an analyst with the research firm Enderle Group in San Jose, California. "Think of the trading organizations that exist in these geographies that trade in world markets that can't trade right now."<sup>1</sup>

## 4. ECONOMIC PRESSURE ON CABLE MAINTAINERS

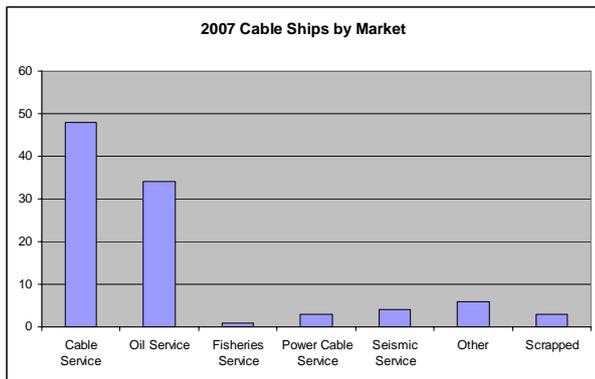
Since Sub Optic 2001, the maintenance assets available worldwide have been reduced in number due to removal from service and redeployment to other markets. This trend is shown in the table below.



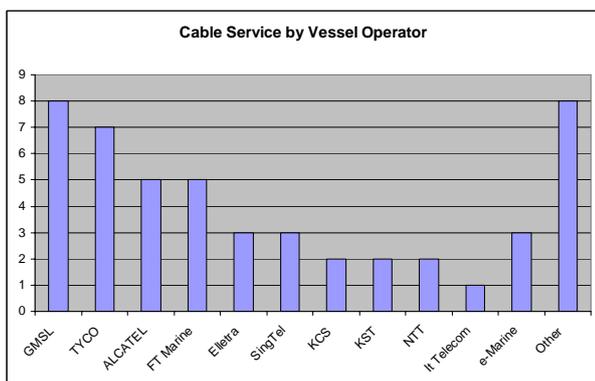
Pre 1995 there were 66 cable ships worldwide with 40 usable for telecoms projects and maintenance and of this 25 were attached to maintenance agreements. In 2001 the number of cable ships had grown to over 100 with more than 30 in maintenance roles. Also, of the 42 new ships, 24 were new builds and 18 were conversions<sup>2</sup>. The graph utilizes data from Submarine Telecom Forum - for years 2001 through 2006<sup>3</sup>.

Since 2001, the price of oil and hurricane damage repairs have energized the oil industry and attracted

several of the DP-2 Cable Vessels to perform various functions within the oil industry, further reducing available assets.



Captain Rickards postulated at that time that a “consolidated world cable fleet” based on geography alone would encompass 50 ships and include 2 mobile Cable Spreads which would utilize vessels of opportunity during high periods of activity.



The above chart shows present day vessel operators with vessels in cable service which total 51.

## 5. PERSONNEL FLIGHT

Along with the vessels leaving cable service many highly experienced personnel have left the industry<sup>4</sup> as a means of economic survival or for better career stability, pay and benefits. These skilled individuals are highly desirable in the oil industry since much of the submarine equipment and procedures are very similar to those utilized in the cable industry.

## 6. IMPROVED MARKETPLACE

The downturn in the telecommunications industry caused system suppliers to broaden their focus to alternative markets. At a recent conference in Dubai, both TYCO and Alcatel focused their presentations on oilfield and scientific systems. At the same time the Telecommunications bandwidth glut appears to be easing evidenced by system upgrades and new projects under consideration. SubCableNews<sup>5</sup> has identified 58 unrepeated and 67 repeated projects under various stages of consideration. Additionally, they identified 14

scientific cable systems and 147 wind farm projects also under various stages of consideration. This level of interest is certainly good for the marine cable industry but could significantly increase pressure on maintenance resources.

## 7. PRESENT MAINTENANCE AND REPAIR STRATEGIES

The operational models for maintenance and repair of submarine cables have remained virtually unchanged over the years.

It is no longer viable, except for the largest telecoms companies to effectively own their own maintenance solution. Additionally, entering into the marine service business is a costly and technically challenging enterprise.

Further, given asset availability and utilization, it is difficult for the marine companies to offer the price reductions that are demanded by the telecoms companies without being able to increase the utilization of the vessels more efficiently. This is evidenced by the migration, both temporary and permanent, to the oil and seismic sector.

## 8. ZONE BASED MAINTENANCE SERVICES

This approach generally creates a mechanism where a group of Cable Owners enter into an agreement with the Cableservice Owners to provide maintenance services in a geographic area. This agreement is managed by experienced players in the submarine telecommunications businesses who establish an agreement for cable maintenance service.

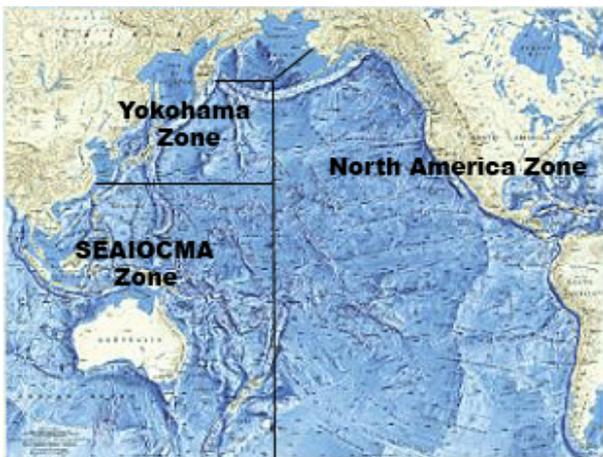
Typically, the cost is established based on the standing charges (vessel costs while on standby) divided by aggregate cable length within the zone and then allocated to each participant based on the individual cable system length. Previously, this allocation was based upon cable system capacity but higher capacity (DWDM) systems made this approach impractical. Should a fault occur, running costs (operating costs such as fuel, lube and additional repair specialists) are to the account of the Owner of the faulted cable.

Examples of these agreements are:

- The North Sea Cable Maintenance Agreement 2002 (NSCMA 2002)
- The Atlantic Cable Maintenance Agreement 2004 (ACMA 2004)



- The Baltic Sea Cable Maintenance Agreement (BSCMA).
- The Pacific Indian Ocean Cable Maintenance Agreement (PIOCMA.)



- South East Indian Ocean Cable Maintenance Agreement (SEAIOCMA).
- Middle East Cable Maintenance Agreement (MECMA).

**9. PRIVATE DEDICATED OR PRIVATE SHARED MAINTENANCE SERVICES**

This model is a contractual arrangement between each cable (solely owned or consortium) and a marine maintenance supplier.

The cost basis for this arrangement is a standing charge (vessel costs while on standby fixed for the contract duration) and running charges. Alternative arrangements for running charges include a prenegotiated additional charge for each repair

conducted or actual additional costs plus an administrative fee.

**10. SINGLE OR MULTIPLE MAINTENANCE VESSELS ON CONTINUOUS STAND BY ANYWHERE IN THE WORLD**

This model is utilized on the SAT-3/SAFE cable system with a dedicated vessel on standby full time to maintain the cable system. This model was necessary due to the geographic considerations of the cable system. All costs are borne by the cable owner.

**11. CALL-OUT MAINTENANCE AGREEMENTS**

This model is an emergency response activity. The cable owner goes to go the marine maintenance spot market following a cable system fault. The downside of this model is vessel availability, timely response and potential high spot market vessel rates.

Depending on installation specifications, route selection cable protection strategy employed and risk assessment based upon Worldwide Cable System Fault Trends<sup>6</sup> the operator may decide to use this method. Other considerations include as well as alternative traffic routing strategies and costs associated with providing service to customers. It could be the case where costs associated with rerouting traffic are below the costs associated with a highly responsive maintenance strategy and thereby allow a less responsive and subsequently less expensive maintenance strategy to be employed.

**12. NEW PARADIGM**

The economic incentive to return a cable system to service dominates the maintenance responsiveness consideration by a cable operator. Continued pressure to find the most economically efficient repair capabilities will be demanded by the cable owners.

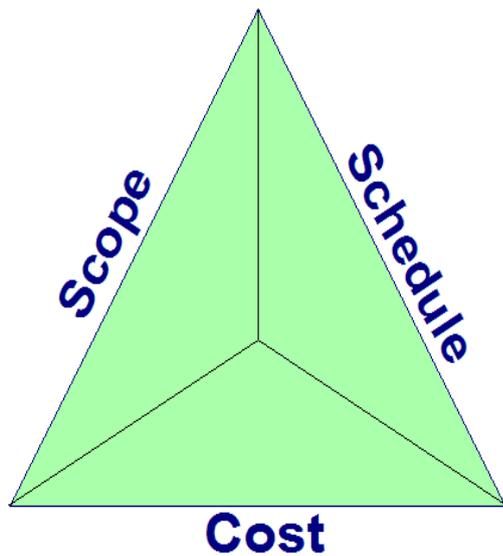
The previously presented marine services environment leads one to postulate a potential shortage of marine assets for installation and fault repair. Further, during past growth periods many maintenance assets were co-utilized for installation activity.

A well recognized construct for project management shows that for any activity the relationship among Scope, Schedule and Cost are directly related. The Telecommunications Industry is no exception.

Cable System Operators are frequently characterized as demanding the highest quality for the least cost in the shortest time. However, if cost is the dominant factor then alternatives become possible if flexibility regarding schedule or scope can be considered.

The basis of this new paradigm is that Cable System Operators already have in place redundant communications transport arrangements which translates into a mechanism to make available additional time to the marine service activity. This additional time makes

feasible non traditional repair schemes previously not considered.



It is well understood that highly equipped cable ships are required to make a cable repair to the specifications necessary to meet the system life and reliability requirements initially specified during the cable system acquisition.

However, as evidenced by the Boxing Day failure which occurred beyond the capabilities of ROV's (>3300M)<sup>7</sup> and necessitated grappling operations, many deepwater system faults have the potential to utilize less well equipped vessels and conduct a temporary repair which would utilize fully qualified components and personnel.

It is our position that mobile systems configured for air freight transportation from a central location combined with strategically located hardware for those components too large to air freight, along with a cadre of trained cable repair personnel would meet the necessary technical requirements for a temporary cable repair. This concept depends heavily on the availability of a suitable vessel which has been identified in advance, surveyed and engineered to facilitate the installation of winches or linear cable engines necessary for the repair activities. Further, suitable contract mechanisms are required which can be put into force on relatively short notice. Traditionalists will chafe at the notion that anything other than a modern cable ship can conduct this activity. However, the vessel requirements to grapple a faulted cable and to buoy it off are relatively straightforward.

In those cases where the cable repair requires ROV intervention, an ROV could be added to the flyaway package. In the oilfield, ROV systems are mobilized in relatively short times and operate off many types of vessels. The number of suitable vessels for grappling

and ROV operations is considerable and proven in oilfields of the world.

Finally, 3U Technologies has identified several niche markets which utilize suitable vessels that could be configured and diverted from the base industry and utilized for occasional cable system maintenance. This is both geographically and industry dependent. The flexibility comes from the base industry allowing the vessel to detach and conduct the repair activity and then resume the base activity.

It is our contention that this approach has the possibility of providing a responsive capability in times of traditional cables lack of availability. While not a panacea for all maintenance needs nor eliminating traditional cables, this approach has the prospect of returning cable systems to service earlier and eliminating rerouting costs while allowing the cable owner the flexibility to schedule the final repair when economically advantageous.

### 13. SUMMARY

The Telecommunications Marine Marketplace continues to evolve from the "club structure" to SPV's to large Independent operators. It is highly likely that the new entrants to the industry will not be satisfied with the marine maintenance status quo and take the initiative to explore new paradigms. With this change come opportunities to rethink maintenance strategies and potential solutions to the supply / demand balance within the marine industry.

This paper provides one view of the alternatives which should be considered as part of the continued evolution of the Submarine Telecommunications Industry.

### 14. REFERENCES

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<sup>1</sup> Internet Services in Asia May Take 2 Weeks to Return (Update7) By Tim Culpan and Andrea Tan, Dec. 28 (Bloomberg)

<sup>2</sup> Captain Dave Rickards, presentation at EMEA 2002

<sup>3</sup> [www.subtelforum.com/](http://www.subtelforum.com/)

<sup>4</sup> Dr. Phil Hart, PTC-2004

<sup>5</sup> <http://www.subcablenews.com>

<sup>6</sup> Kordahi et al, Worldwide Trends in Submarine Cable Faults, ([www.scig.net](http://www.scig.net))

<sup>7</sup> GMSL News Release 5 January 2005