How EPIC are submarine cable systems?

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Abstract: Engineering, Procurement, Installation and Commissioning (EPIC) of submarine cable systems is commonly carried out on a "turnkey" basis. The engineering, construction and implementation of a new submarine cable system is extremely costly and involves a great deal of complexity. An example of complexity studied in this paper is submarine cable permitting requirements and its corresponding timescales. Management of this activity is vital as it is frequently observed to become a critical path activity. This is one of many reasons why purchaser involvement is essential. This paper also considers why turnkey projects cannot be solely managed by the supplier, and how in reality this concept/model has been not proven to be applicable to all new-build projects.

1. INTRODUCTION TO TURNKEY CONTRACTS

The construction of a new submarine cable system involves many people of different expertise who join forces from both the supplier and purchaser side. Ideally, a turnkey supply contract can reduce the purchasers' risk and responsibilities, as the engineering, manufacture, supply, installation, training, testing, commissioning, and any other works deemed necessary, is outsourced to the contractor. Non-turnkey proposals are usually rejected out of hand.

There are a number of reasons why purchasers tend to opt for a turnkey solution. Fundamental examples include:

- Limited time;
- Lack of availability of experienced resource on the purchaser side;
- Simple organisation structure between purchaser and the contractor;
- Single point of contact;
- Single supply contract for the various components of the submarine cable system;
- Contractor assumes full responsibility of project delivery and system integration.

However, the reality of submarine system projects can be very different from this aspiration: the idea of a product that can be immediately used just by "turning the key", that is, with no additional effort on behalf of the purchaser, is not often borne out in reality in the submarine cable industry. [1] Therefore, the full benefits of the turnkey model are not usually achievable.

2. EPIC SUBMARINE CABLE SYSTEMS

The construction of a submarine cable process can conveniently be categorised into four main areas from the purchaser

perspective: Engineering, Procurement, Installation and Commissioning (EPIC).
It is observed that the supplier responsibility structure and organisation is somewhat mimicked within the purchaser forum even when a turnkey solution is used. The following table provides a high level guideline of the supplier / purchaser personnel who share similar roles and responsibilities.

Submarine System Supplier	**Purchaser Equivalent Representatives**
Company Directors	Management Committee (MC)
Contract Manager	Procurement Group (PG)
Submarine Systems Engineer / Line Project Manager	Technical Working Group (TWG) + Marine Working Group (MWG)
Project Coordinator	Commissioning Co-Ordinator
Project Management Team	PG / Project Manager (PM)
Manufacture Team	Quality Assurance Team
Shipping & Logistics Team	PM and Local Landing Parties
Installation and Commissioning Team	Landing Party Working Group (LPWG) / Quality Assurance Representatives (QARs)
System Support	Operations and Maintenance (O&M) Team

Table 1: Overlapping supplier and purchaser roles

The pool of purchaser equivalent representatives typically have a subject matter expert to chair each of the groups. They are appointed to meet key deliverables within the specific subject area. A summary of the key groups are as follows:

Management Committee (MC): This group would typically comprise of one key investor per administration in a consortium submarine cable system. Naturally, this group is redundant if it was a private system; the MC would be the investor(s).

Procurement Group (PG): Key responsibilities include policing the supply contract, commercial negotiation (Supply and non-Supply Contract costs), formation and maintaining project budgets, handling new requirements or project changes such as contract variations.

Technical Working Group (TWG): This group is primarily responsible for the technical integrity and qualification of the system. System design, review, as well as managing technical issues through the course of the project are handled by this team. This group is also responsible for ensuring the dry plant technical requirements of a supply contract are enforced and achieved.

Commissioning Co-Ordinator: Commonly works alongside the TWG Chair depending on the scale of the project. This groups primary role is to manage the Quality Assurance Representatives (QARs) through the various testing phases from in-station testing, segment commissioning and network commissioning.

Quality Assurance Representatives (QARs): Their primary objective is to witness and validate the supplier's tests

conducted in the field. They are also commonly referred to as Inspection Authorities (IAs).

Marine Work Group (MWG): This group is primarily responsible for cable route survey, route engineering, cable protection and installation. This group is also responsible for ensuring the wet plant technical requirements of a supply contract are enforced and achieved.

Landing Party Work Group (LPWG): This group is not commonly used in consortium submarine cable systems. However, its primary objective is to be the point of contact for cable landing station construction (new build system) or the handling of new space, power and cooling requirements for an upgrade to an existing system. These details are usually obtained from the PG representatives if such group does not exist.

It is evident from the working groups above that purchaser involvement remains high even when a nominally turnkey solution is used, contrary to the first benefit; considerable time and resource is expended on the purchaser side.

Recent new build projects have shown that permitting requirements and its corresponding timescales are frequently observed to become a critical path activity. Therefore, the management of this activity is crucial. In reality the engineering deliverables often becomes of secondary importance, especially when considering other purchaser-specific responsibilities such as station space and power, network administrator and operational systems, station mux equipment, backhaul, trans-national links, etc. Similarly for upgrades where no wet plant (telecommunications cable, repeaters, branching units, etc.) is installed or upgraded, non-supply costs can be dominant. [1]

One solution to this permitting problem could be the addition of a new specialised working group, where, for instance, nominated contacts from each Landing Party come together to create a Permitting Working Group (PWG).

3. PERMITTING WORKING GROUP (PWG)

Permitting for submarine cable system projects can be an extremely complex and time consuming due to the vast number of permits required. The types of permits and the process for obtaining them can also be location specific.

An example of extended complexity to location-specific permitting requirements can be seen at the United States (U.S) coastal ports. The Merchant Marine Act of 1920, also known as the Jones Act, regulates the maritime activity and only allows U.S. vessels to transport wet plant (or any other haulage) between U.S. ports. [2] Consequently, the installation and maintenance of a submarine system; carried out by a non-U.S. manufactured vessel can be extremely challenging. The inability to transport wet plant consecutively between U.S. ports can be problematic for handling spares. This demonstrates how marine planning would be critical for a new transatlantic submarine cable system when installed by a non-U.S. supplier. More recently restrictions have been passed into Indonesian and Chinese law. Temporary importation is also sometimes required by countries such as India when a foreign vessel arrives in territorial waters. Knowledge of county-specific restrictions and processes would therefore prove to be beneficial to help de-risk the project.

Irrespective of location, permitting requirements can be categorised into the following three areas of water: [3]

1. Territorial Water – up to 12 nautical miles from shore.

2. Exclusive Economic Zones (EEZs) – from 12 to 200 nautical miles from shore.

3. Areas Beyond National Jurisdiction (ABNJ) – 200 nautical miles beyond shore.

Permitting is typically applicable to territorial water and EEZ areas. Figure 1 differentiates the various types of permits which are required for physically having a submarine cable system in place, versus operational permits to implement the submarine cable system. The process for investigating which permits are applicable is initiated during the Desktop Study (DTS) phase under the supply contract. It would be advantageous to separate the DTS from the supply contract to allow the permitting requirements to be defined for early engagement and action. The benefit of completing this beforehand is likely to outweigh the disadvantage of the purchasers securing separate funding prior to supply contract signature.

The environmental impact of the build of a new submarine cable system is studied under the Environmental Impact Assessment permit. The Ministry of Foreign affairs permit considers international economic, political, security, cultural and social matters. Actions are taken to reduce these impacts as an outcome of these permits. Both of these permits are becoming increasingly stringent to obtain, thus engagement of local stakeholders would prove to be beneficial for the PWG.

To complicate matters further, it is observed that Marine Protected Areas (MPA) and mineral extraction areas are being designated to ABNJ. [4]

One example of an organisation that is designating MPAs in ABNJ is the OSPAR Commission. The OSPAR Commission's interest is in protecting and conserving the North-East Atlantic seas and its work is concentrated in the following five main areas: [5]

1. Protection and conservation of ecosystems and biological diversity;

2. Hazardous substance;

3. Radioactive substances;

4. Eutrophication (supply of nutrients to the environment);

5. Environmental goals and management mechanisms for offshore activities.

Not all of the above five subject areas are directly applicable to submarine cable systems; however, the assigned geographical areas may impact the planning of a new submarine cable system route. Alternatively, it may influence the marine operations of an existing submarine cable system which either goes through, or is in close proximity, to a newly defined MPA. Therefore, PWG members would add value by having extensive knowledge and understanding of The United Nations Convention on the Law of the Sea (UNCLOS), since it is this organisation who would define any requirements in this zone.

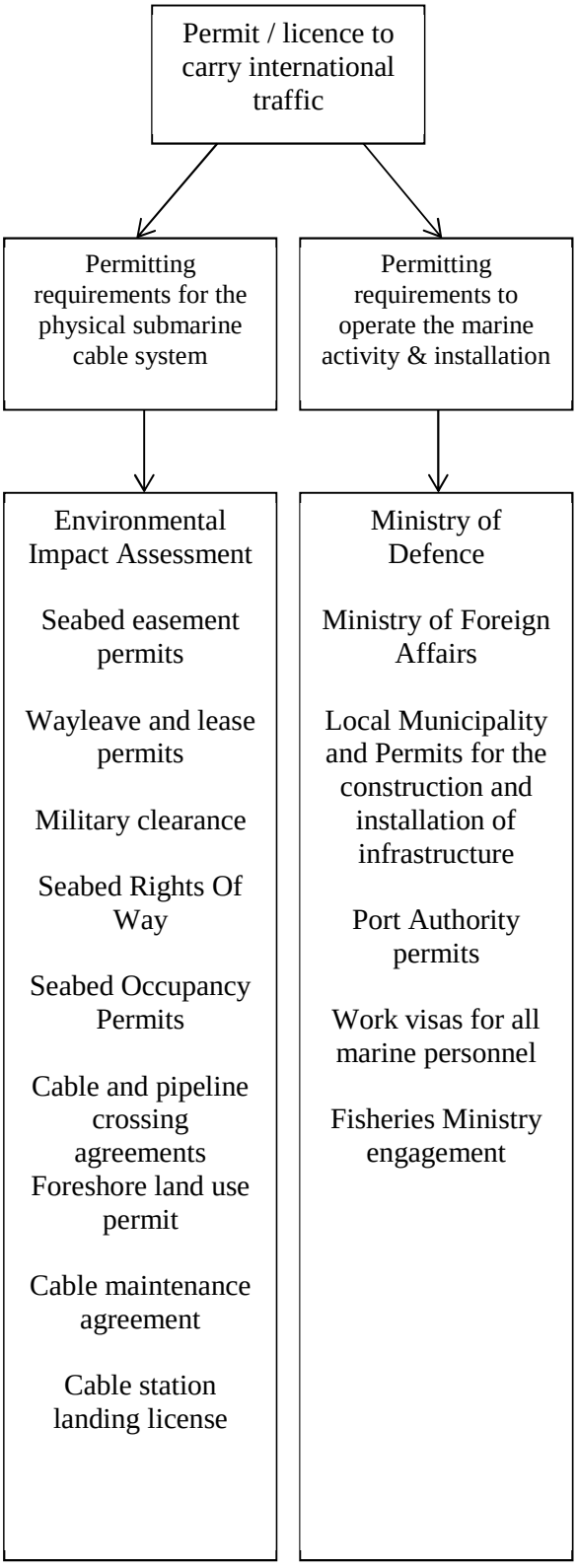

Figure 1: Permit types

4. CONCLUSIONS

An apparent deviation from the turnkey model is evident, as well as permitting becoming the critical path activity for new submarine cable systems. Turnkey projects cannot be solely managed by the supplier and the benefits of the various purchaser work groups are recognised. A new group (PWG) to handle permitting requirements efficiently is proposed. Early engagement of local stakeholders with jurisdiction knowledge, ideally before desktop studies, is highly desirable.

5. ACKNOWLEDGEMENTS

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6. REFERENCES

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