



Turnkey Submarine Cable Systems



Submarine Telecommunications Systems at NSW Today

NSW is one of the world's leading suppliers of fiber-optic submarine cable systems, energy cables, custom-made underwater cables for the offshore industry and aerial cable systems for backbone terrestrial telecommunications applications.

As a top supplier of repeaterless and repeatered fiberoptic submarine cable systems, NSW offers fiber-optic submarine cables and one-stop-shop for fiberoptic submarine cables, accessories and associated turnkey services. Due to the fact that these projects are large and complex and errors costly, more and more investors and network operators are opting for the point-to-point or turnkey approach. By placing the entire project in the hands of a qualified expert, they avoid the risks that result from a lack of submarine project management experience and are able to focus on their own core business. NSW has established itself as one of the leading turnkey suppliers for providing state-of-the-art submarine cable systems on a worldwide basis.

Since May 2007, NSW has been part of the General Cable Group. General Cable is a global leader in the development, design, manufacture, marketing and distribution of copper, aluminum and fiber-optic wire and cable products for the energy, industrial, specialty and communications markets.





Quality and quality assurance have always been and will continue to be key elements of NSW's activities. NSW established, documented, introduced and maintains a quality management system according to the standards ISO 9001:2000 and ISO 14001:2004 which has been certified and is reviewed regularly for effectiveness by LRQA auditors. At NSW we are committed to teamwork and open communication both in-house and with all our clients. We aim to provide practical and creative solutions designed to help our customers effectively meet the underwater challenges of the twenty-first century. By utilizing all our skills and resources, we aim to extend the frontiers of submarine cable technology.



Submarine Cable Systems Offered by NSW



Planning Submarine Networks

Developing the Concept

Worldwide demand for submarine bandwidth continues to grow, but it is obvious that this growth is not distributed evenly over all locations. The feasibility of adding new bandwidth supply depends on the economic and technical characteristics of the systems previously installed and currently planned. Typical examples of systems that can close coverage gaps are regional networks that bring capacity to users in areas not immediately contiguous with the landing points of transoceanic systems. Local submarine network rings can also provide an attractive



and economical complement to existing, unconnected terrestrial networks by creating meshed systems that ensure far greater system availability than other configurations.

Business Case

The key to a successful submarine network project in today's market is a convincing business case that addresses gaps in bandwidth coverage and delivers a coherent concept on how to close them. At the outset of a project, NSW reviews the feasibility of the proposed cable system with the customer on the basis of an analysis of the market to be served.

Desktop Study

The concept developed in the process evolves into the system best suited to meet the needs of this market and is also the starting point for further steps, such as preparation of a detailed business case to satisfy the requirements of equity investors or lending institutions providing project financing. Once the basic project parameters have been defined, NSW prepares a desktop study in which all available information on the proposed submarine cable route is collected and evaluated. A system architecture is proposed, and the overall technical requirements of the planned submarine network are reviewed with the customer. Initial legal, commercial and contractual preparations for implementing the project are made and information is gathered on all required approvals (rights-of-way, environmental permits, government approvals, etc.).

Marine Survey

The marine survey is a mission-critical element of every submarine network project. Because the margin for error during laying operations is small and the cost of failure far greater than it would be in the case of a terrestrial network, obtaining exact information on the proposed cable route is essential. After the initial concept development and planning phase, but prior to cable manufacturing and laying operations, NSW commissions a bathymetric study of the ocean floor along the proposed cable route from a competent marine surveyor. The purpose of

During the marine route survey, the seabed is mapped by means of Multibeam, Side-Scan Sonar (SSS) and Sub-Bottom Profiling (SBP). The relevant geophysical measuring systems are installed on a fish which is towed behind the vessel in the seawater (picture below). If the seabed consists of soft sediments like sand or clay, samples can be extracted periodically for analysis by dropping a gravity corer into the ocean floor. The device is recovered and the potential impact of the sedimentary layers on the cable installation process is later evaluated by marine geologists. this study is to corroborate or update the information in the desktop study.

Since the choice of the cable route has a crucial impact on all subsequent phases of the project and decisions regarding the route need to be made on an ongoing basis in the course of the survey, NSW's experts are on board the survey ship throughout the process to monitor the surveying work and relay information on the cable route to engineers at NSW's project office. The survey data are evaluated and, if necessary, modifications are made to the cable route initially proposed.

After completion of the survey, NSW reviews the geophysical and other data collected with the customer's technical experts and defines the final architecture of the cable system and the precise cable route involved. Straight-line diagrams showing cable features and cable protection measures along the cable route and power budgets detailing the key optical features of the cable system are prepared. Cable type and the cable protection measures (armoring, burial etc.) required to meet the demands of the project as well as all necessary cable joints, housings and other system details are finalized.





Implementation

From the operator's standpoint, the success or failure of a submarine project can often be summed up in three words: speed to market. The faster a project can be implemented, the more economical financing becomes and the more profitably system capacity can be sold to bandwidth customers. NSW helps customers achieve profitability through efficient management of their submarine projects. All operational permits are obtained, the cable is laid and protected along the cable route with state-ofthe-art protection measures. An optimum trade-off is maintained between the cost and the technical measures to meet the customer's present and future objectives. NSW supervises shore-end preparations and cable-landing operations and oversees the integration of the cable system with the onshore transmission equipment.

Network Installation and Commissioning

NSW's laying and logistics concept allows it to install and manufacture cable simultaneously. To facilitate uninterrupted laying operations, laying ships are supplied with cable by feeder ships, thus making it unnecessary for the cable-laying ship to return to



the cable factory to load cable in the course of the project. Quality management experts inspect the cable and other system components and test their optical properties throughout the manufacturing and installation process. As they are completed, sections of the network can be commissioned and opened to traffic if the customer so desires.

As-Built Documentation

Upon completion of the entire system, NSW arranges for its provisional and final acceptance by the customer and for training of the customer's personnel. At the end of the project, the customer receives a complete as-built documentation package that shows details of the network, the position of the cable on the ocean floor and features of the seabed along the entire cable route. All essential information recorded on the ship during the installation phase is included.

Submarine Network Repair and Maintenance

An operator's ability to ensure the optimal level of network availability for customer traffic is a key competitive advantage. As part of every turnkey project, NSW reviews the submarine network's future repair and maintenance requirements with the customer and proposes a solution specially tailored to meet his needs. NSW possesses some of the most modern equipment in the industry, and can develop and implement comprehensive repair and maintenance packages for submarine networks.

MINISUB™

Fiber-Optic Submarine Cables and Accessories

NSW's flagship cable product is MINISUB™, a rugged, lightweight fiber-optic submarine cable with unique features that make it the cable of choice for short-to-medium-range submarine networks:

- The MINISUB[™] central copper tube ensures reliable protection of the fibers in the core against hydrogen ingress.
- The cable's fibers have excess longitudinal length and are not coupled to the cable's outer structure. This prevents fiber damage during cable handling and laying, and thus guarantees optimal fiber performance throughout the life of the cable.
- > MINISUB[™]'s high specific gravity and thus optimal sinking speed facilitate accurate laying exactly "on-route."
- > Its compact design ensures a tight bending radius to simplify cable handling, logistics and installation.

MINISUB[™] is available in lightweight (LW), singlearmored (SA) and double-armored (DA) versions. Fiber count and type are selected jointly with the customer to meet the requirements of each individual project. Thanks to its long association with one of the best fiber manufacturers in the world, NSW has access to advanced submarine fiber technology. Low-attenuation and dispersion-managed fibers are selected when needed to meet the specific requirements of individual links along the cable route. The cable burial and protection techniques used by NSW ensure that MINISUB[™] can be installed safely even when marine-hazard areas such as fishing grounds and harbors cannot be avoided.

In addition to MINISUB[™] fiber-optic submarine cables, NSW's products include flexible underwater cable joints and branching.



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