

Article Overview

Deep optical cables are submarine fiber optic cables laid on the ocean floor to transmit data across continents, protected by multiple layers to withstand extreme underwater conditions.

Overview

Deep optical cables, also known as submarine communications cables, are laid on the seabed to carry telecommunication signals, including internet, telephone, and private data traffic, across oceans and seas . Modern cables use optical fibers at their core, which transmit data as pulses of light at nearly the speed of light, enabling high-speed global connectivity . These cables are critical infrastructure for international communications, supporting everything from web streaming to financial transactions.

Construction

A typical deep-sea optical cable is surprisingly thin, about the diameter of a garden hose, but it contains multiple protective layers :

- o Optical fibers: The core, made of delicate glass fibers, carries data as light pulses.
- o Copper casing: Conducts electricity to power optical amplifiers along the cable.
- o Steel armour wires: Protect against physical damage from anchors, fishing equipment, and rare marine hazards.
- o Polyethylene sheath: A durable, waterproof outer layer that shields the cable from corrosion and environmental stress . Deep-sea cables are designed to last around 25 years and must withstand crushing pressures, saltwater corrosion, and underwater hazards .

Installation and Depth

Submarine cables are laid using specialized cable-laying ships that carefully unspool the cable along a pre-surveyed route of the ocean floor . In deep ocean areas, cables are typically laid directly on the seabed, while in shallow or high-risk areas near shore, additional protection such as armoring or burial may be used . For terrestrial fiber optic cables, burial depths vary depending on environmental factors and regulations. Typical depths range from 24 to 48 inches (60-120 cm), with deeper burial in areas prone to frost, heavy machinery, or erosion . While deep-sea cables are not buried in the same way, near-shore sections may be buried to prevent damage.

Historical Context

The first submarine cables were laid in the 1850s for telegraphy, with the first transatlantic cable operational

Deep Optical Cable

in 1858 . Early cables used copper cores insulated with gutta-percha, while modern systems rely on optical fibers for high-speed digital communication. Over time, these systems evolved from telegraphy to telephone traffic and now to high-capacity internet data.

Importance

Deep optical cables form the backbone of the global internet, connecting continents and enabling real-time communication worldwide. They are a strategic and high-investment infrastructure, with single trans-oceanic projects often costing hundreds of millions of dollars . Their reliability and protection are critical to maintaining uninterrupted global connectivity.

Laced across the cold depths of the world's oceans is a network of multimillion-dollar cables, which have become the

Submarine cables are the backbone of the internet carrying 99% of international traffic and are underwater ocean links known as

The global fiber optic network, spanning over 1.8 million km as of 2025 (per TeleGeography),

Learn how deep fiber optic cables are typically buried (12-36 inches) and what factors affect their burial depth. Avoid

These early cables used copper wires in their cores, but modern cables use optical fiber technology to

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These invisible highways, consisting of fiber-optic wires connecting landing points, are

Download scientific diagram | Shallow to deep-water (left to right) fiber optic cables" specifications. from

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When planning a fiber optic network installation, one of the most common questions is: How

Learn how deep fiber optic cable is buried, key factors affecting buried fiber optic cable

Interactive map of 700+ submarine cables worldwide - explore routes, landing points, owners, year of service and length. Click any

Deep Optical Cable

As we provide our reflections on World Oceans Day, it's clear that the ocean is not just a vast

It's been a great journey to deep dive into how Google plans and builds its fiber optic cable network. Every engineer,

Submarine fiber optic cables carry over 99% of international data traffic. Unlike terrestrial

We deliver a new generation of solutions designed for harsh undersea environments including our

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