



# COLDSUN

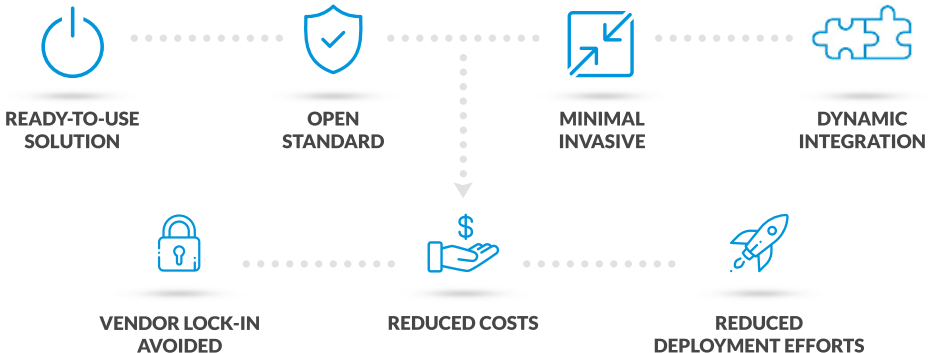
COMMUNICATE BEYOND ELEMENTS



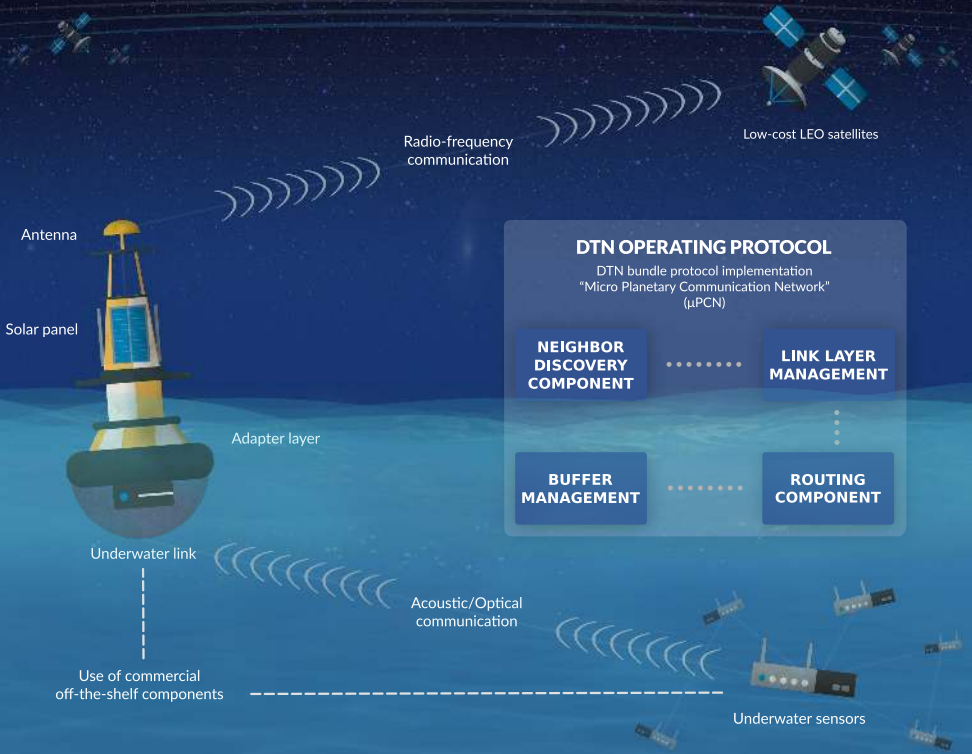
## TRANSMIT DATA BETWEEN **UNDERWATER NETWORKS** AND THE INTERNET VIA **SATELLITE NETWORKS**

The COLDSUN project (COmmunication reLay for Deep-Sea Underwater Networks) is an initiative started by D3TN and is supported by the European Space Agency (ESA). The project's goal is a communication service that allows to transmit data between underwater networks and the Internet via satellite networks. The overall system renders possible low-cost data transmission using a relay buoy equipped with interfaces for underwater as well as satellite communication. This relay is based on open-source software and commercial off-the-shelf components. By that, it offers a cheap and flexible communication solution for companies operating in a maritime environment.

### VALUE PROPOSITION



# TECHNICAL DETAILS



## NEIGHBOR DISCOVERY COMPONENT

In order to extend the underwater network in an ad-hoc fashion and to integrate further nodes dynamically, a neighbor discovery component is leveraged. Besides identifying direct neighbors, the component uses a protocol capable to distribute information about transitively connected nodes. The dynamically-determined topological information is handed over and used by the routing component.

## LINK LAYER MANAGEMENT

In order to transmit data to the underwater nodes as well as to the space segment, handling of both incoming and outgoing data via dedicated physical links has to be coordinated.

## BUFFER MANAGEMENT

Due to potentially high error rates and disruptions occurring between the relay system and neighboring nodes (underwater nodes as well as satellites), a mature packet buffer management system is necessary. It will be leveraged in order to handle retransmission of lost or corrupted data.

## ROUTING COMPONENT

One of the software's technological core features is its capability to determine optimal paths to the receiving nodes based on an innovative routing approach optimized for Delay- and Disruption-tolerant Networks. It takes into account the overall network structure and detected traffic patterns in order to determine the optimal next hop.

## AREAS OF APPLICATION:

- ✓ Maritime research institutions collecting data for research purposes from underwater sensor systems
- ✓ Mining companies having to transfer data from underwater mining infrastructures for monitoring purposes
- ✓ Offshore windpark operators for gathering environmental data via underwater sensor systems
- ✓ Fishing companies to collect data about shoal of fish
- ✓ Underwater maintenance and monitoring services to collect and analyze data from underwater constructions