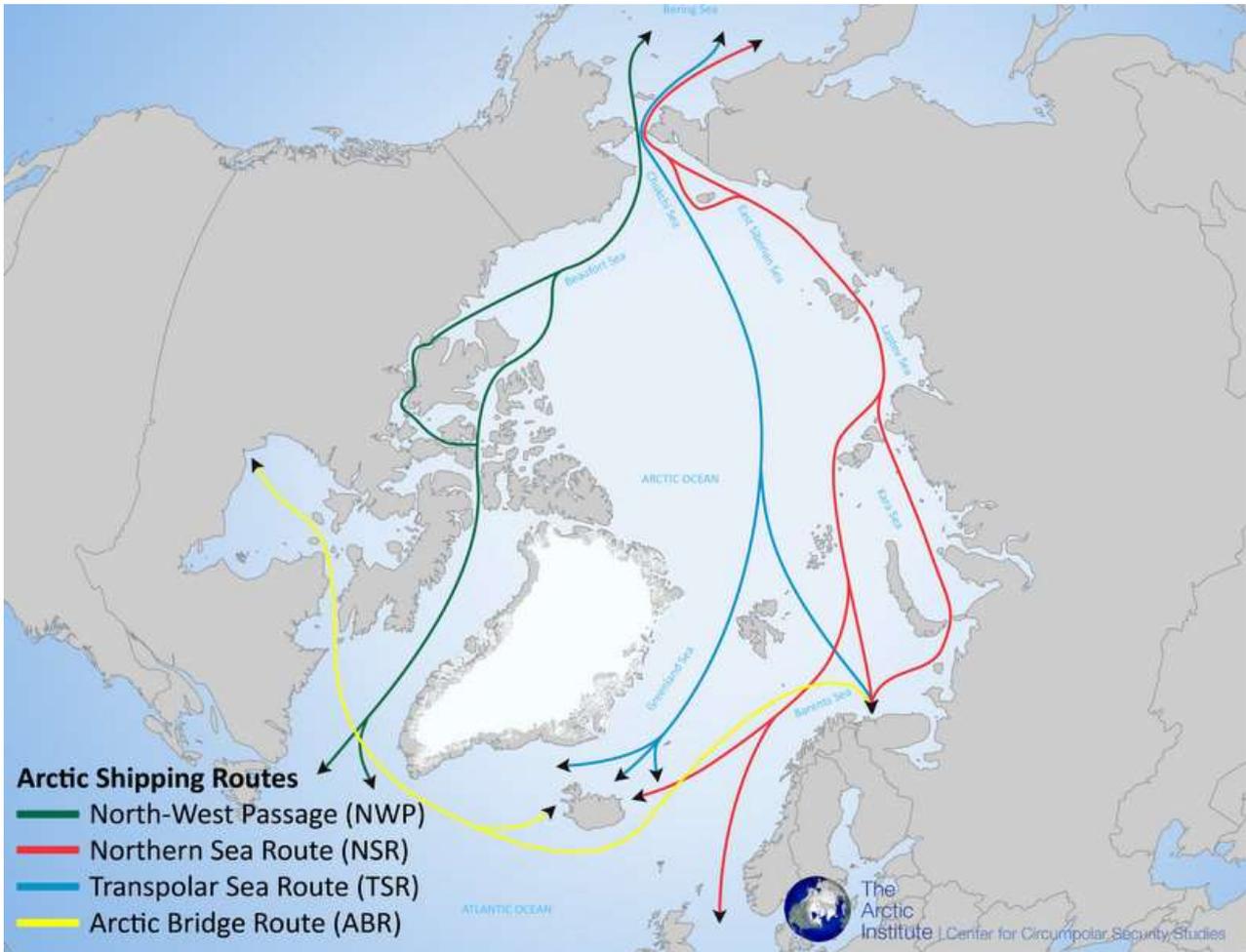


ARC-REACH Arctic Ship Operated Low Power Data Network

A number of countries are making preparations to turn the rapidly warming Arctic into a busy global shipping route to sail between principal locations behind the Arctic Circle, Europe and Asia. Existing regular shipping services such as to Greenland and Spitsbergen will see their activities grow as accessibility to these remote fast-changing vulnerable areas increases.



(Map: Arctic Institute, November 2016): Various shipping routes that are opening up to cargo ships as warming global temperatures reduce Arctic summer sea ice.

These changes imply 2 needs:

1. Commercial ship owners have an increased need for tracking of the cargo (containers, equipment) both for the environmental protection (in case of incident or loss of cargo) and commercial agreements (real-time tracking of cargo at offloading, etc.)
2. The environment will require additional remote sensing, but which is not cost-effective due to the need of having separate satellite communication for each sensor or experiment.



The objective of the ARC-REACH project is to validate in cooperation with the ship owners and scientific research community the feasibility to setup a low-power long-range dynamic radio network, tailored for tracking of cargo and maritime activity, complemented with remote sensing of the environment. In essence, the concept to be validated is 2- fold:

1. commercial: the introduction of asset tracking (containers, equipment, etc.) on the ships, based on a local radio network - installed on the ship itself - with extreme low-power GNSS sensors attached to the assets. The GNSS sensors communicate to the ship over the local radio network, while the ship itself is connected to internet via the ship's satellite communication.
2. scientific: rely on the commercial backbone (dynamic long range network on the ships) to enable cost-effective remote sensing of the vulnerable environment. Again the sensors will communicate over the local radio network to the ships, and the ships will rely on available satellite communication.

The expected benefits of such a mobile monitoring network are therefore multiple:

- shipowners can offer an additional service to their customers since cargo handling and transport activities can be traced, thereby reducing the risk of error, minimising cargo losses and improving security standards;
- from an environmental perspective, it will be possible to quickly intervene in the event of an incident or loss of cargo, thereby limiting the possible impact on the environment;
- governments and the science community can have a cost-effective access to the radio network to monitor additional data along the frequent and 'fixed' sailing routes.

The ARC-REACH project focusses and is limited to the feasibility study and a small-scale validation of the concept. The team will contact ship operators that may be interested to participate to the project. In addition, the feasibility will verify with scientific communities which remote sensing activities could benefit of the low-power network and how this could affect the total cost of remote sensing in this area.

The objective of the ARC-REACH project is to have a validation of the following key questions:

1. Commercial shipping companies have the need of cargo tracking in the region and show a willingness to pay for the service
2. The proposed technological solution is cost-effective and is proven (on small-scale) to be reliable in a harsh environment.
3. The scientific community confirms the proposed low-power radio network has a cost positive effect on future remote sensing in the area

In the end, the objective is to define with the entities involved a demonstration project, which could be subject of a follow-up project.